



TECHNICAL MEMORANDUM

Acid Sump Area Source Area DNAPL Assessment Operations Plan

To: Mike Riley, ATI Millersburg Operations

From: Renee Fowler, GSI Water Solutions, Inc.
Katie Lippard, GSI Water Solution, Inc.
Kathy Roush, GSI Water Solutions, Inc.

Attachments: Attachment A. Activity Hazard Analysis
Attachment B. Groundwater Data
Attachment C. 2016 Excavation Sidewall Soil Data
Attachment D. Design Investigation and Remedy Selection Report Groundwater Data, Soil Data, and Boring Logs

Date: July 14, 2021

1. Introduction

This technical memorandum (TM) presents the Operations Plan that supplements the *Revised Acid Sump Area Source Area Remedial Design Work Plan* (Work Plan; GSI, 2021) at the Allegheny Technologies Incorporated (ATI) Millersburg Operations Facility (Site; Figure 1) in Millersburg, Oregon. This Work Plan, approved by the U.S. Environmental Protection Agency (EPA) in February 2021, proposed additional source area investigation in the Acid Sump Area (ASA), which is located in the Fabrication Area of the Site (Figure 1). The 1993 remedial investigation/feasibility study revealed the presence of chlorinated volatile organic compounds (CVOCs) in ASA groundwater above EPA National Primary Drinking Water maximum contaminant levels (MCLs; CH2M HILL, 1993),¹ and the groundwater Record of Decision (ROD)² for the Site prescribed the actions that ATI needed to take to mitigate CVOCs.

In 2002, a Groundwater Extraction and Treatment System (GETS) began removing CVOCs from the ASA groundwater through extraction well FW-3 (see Figure 2 for well locations). ATI attempted to install an additional extraction well (FW-8) in the ASA in 2007, but encountered a source of 1,1,1-trichloroethane (TCA) and abandoned the well boring (GSI, 2017). ATI determined that injecting nutrients to accelerate microbial degradation of CVOCs would be more effective at treating the source area and downgradient plume. EPA issued an Explanation of Significant Differences (ESD) to the 1994 ROD that allowed enhanced in situ bioremediation (EISB) as part of the remedy for the Site (EPA, 2009). In 2009, EISB was implemented with a biobarrier (located downgradient of the source area) and hydraulically controlled injections (in the source area) consisting of injectate materials designed to enhance reductive dechlorination. Specifically, ATI

¹ Trichloroethene (TCE) and (TCA) are the primary parent CVOCs in the ASA. Groundwater samples collected during the 2018 groundwater quality monitoring events indicate that concentrations of tetrachloroethene (PCE); 1,1-dichloroethene (DCE); 1,1-dichloroethane (DCA); vinyl chloride (VC); fluoride; and nitrate exceed MCLs.

² *Record of Decision Declaration, Decision Summary, and Responsiveness Summary for Final Remedial Action of Groundwater and Sediments Operable Unit, Teledyne Wah Chang Albany Superfund Site, Millersburg, Oregon* (EPA, 1994a).

injected an emulsified soybean oil and sodium lactate blended compound (substrate), buffering agent (to maintain pH above 6), and dechlorinating bacteria to degrade CVOCs (GSI, 2015). In 2016, ATI performed additional source area remediation by excavating approximately 500 cubic yards of CVOC-contaminated soil from the ASA in the vicinity of FW-8 (GSI, 2017). The excavation was designed to address the TCA-impacted soil that was encountered in FW-8.

Despite dramatically reduced concentrations of CVOCs in the contaminant plume, groundwater quality data collected during the biannual groundwater sampling conducted in 2018 suggest that a persistent source of dense nonaqueous-phase liquid (DNAPL) may exist in the ASA. Additionally, CVOCs concentrations in the vicinity of the PW-98A well location have continued to increase since the spring of 2015, with concentrations exceeding cleanup levels for several CVOCs as of July 2021. Most notably, concentrations of TCA in monitoring well PW-98A have increased by more than an order of magnitude since the fall 2014 monitoring event. Furthermore, CVOC concentrations in well E-11 (located between the Acid Sump Area and the PW-98A well location) have shown minimal increases, suggesting that an additional source zone may be present in the vicinity and upgradient of monitoring well PW-98A. Therefore, ATI plans to implement additional remediation in the ASA and, if an additional source area is identified, in the area upgradient of PW-98A to achieve the groundwater cleanup levels in the ROD (EPA, 1994a). To efficiently and cost-effectively implement the remediation, further source area investigation is necessary to fill data gaps.

This TM provides the details for the field personnel to conduct the additional investigation in accordance with the approved Work Plan. The only change to the Site since the Work Plan was approved by EPA is the removal of 3 baghouses in the ASA courtyard and the installation of a 3-in-1 baghouse in the northwest corner of the ASA courtyard. No wells have been modified since the Work Plan was approved by EPA.

2. Implementation Approach

The approach to implementing the project is organized into the following three tasks:

- **Task 1: Project Planning**
- **Task 2: Rapid On-Site Source Area/DNAPL Assessment**
- **Task 3: Reporting**

The main operational elements of the field work consist of the following activities:

- Monitor ambient air quality during the assessment activities for the presence of contaminants that may adversely impact the health and safety of field and facility personnel.
- Advance soil borings and install temporary wells in the ASA to determine the extent of DNAPL.
- Advance soil borings and install temporary wells in the PW-98A area to determine whether an additional source area exists in this location.
- Collect soil and groundwater samples from both the ASA and PW-98A areas for DNAPL and source area characterization using photoionization detector (PID) screening, hydrophobic dyes, ultraviolet (UV) fluorescence, visual observation, and analysis by a mobile laboratory.

Task 1: Project Planning

Pre-implementation activities to be completed before injections at the Site include the following:

- Updating the Health and Safety Plan for the field portions of the Source Area/DNAPL assessment.
- Coordinating public and private underground utility locates with the Oregon 811 Utility Location Center and the ATI facility before drilling activities.

- Coordinating with mobile laboratory, drilling contractor, and equipment suppliers regarding project schedule and equipment delivery to the Site.

Table 1 provides additional information on technical contractors and key project staff members and contacts.

Table 1. Project Team/Material Vendors/Technical Contractors

Contact	Project Role	Phone Numbers	
Mike Riley (ATI)	Site Contact	(b) (6)	(cell)
Noel Mak (ATI)	Site Contact and Project Manager		(cell)
Edgard Bertaut (ATI)	ATI Corporate Contact		(cell)
Renee Fowler (GSI)	GSI Project Manager		(cell)
Kathy Roush (GSI)	GSI Project Manager		(cell)
Joe Sherrod (GSI)	GSI Geologist		(cell)
Chan Pongkhamsing (EPA)	EPA Project Manager	206.553.1806	(office)
Don Clabaugh (EPA)	EPA Hydrogeologist	206.553.0682	(office)
Dave Nazy (EA)	EPA Consultant	360.789.7382	(office)
Ann Farris (ODEQ)	ODEQ Project Manager	541.687.7361	(office)
ATI South Gate	Emergency Contact (Fire/Medical)	541.812.7177	
Emily Bushlen (Libby)	Mobile Laboratory Project Manager	360.352.2110	(office)
Ryan Galbreth (Cascade)	Drilling Contractor Project Manager	(b) (6)	(cell)
Mike Burbee (Columbia)	Concrete/Ashalt Coring Project Manager		(cell)

Notes

ATI = ATI Millersburg Operations

EA = EA Engineering, Science, and Technology, Inc.

Cascade = Cascade Drilling

GSI = GSI Water Solutions, Inc.

Columbia = Columbia Concrete Sawing

Libby = Libby Environmental, Inc.

EPA = U.S. Environmental Protection Agency

ODEQ = Oregon Department of Environmental Quality

Task 2: Rapid On-Site Source Area/DNAPL Assessment

Task 2.1: Air Quality Monitoring

ATI anticipates that approximately 5 field days will be required to assess the limits of the source zone. Ambient air quality will be monitored during drilling and assessment activities using PID units and draeger tubes. PID units will be placed in the observation areas, in the vicinity of the drill rigs, and in the areas where the soil cores are being processed. The PID units will be placed in the breathing zone located between 4 and 5 feet above grade surface and ambient air will be continuously monitored during the assessment activities. If elevated volatile organic readings are recorded by a PID unit(s), draeger tubes for vinyl chloride (VC), 1,1-dichloroethene (DCE), and trichloroethylene (TCE) will be utilized to determine (1) the specific constituent concentrations and whether the concentrations will require the use of respirators, (2) whether the level of personnel protective equipment (PPE) should be increased, and (3) whether the exclusion zone should be expanded. Additional information regarding air quality monitoring and acceptable exposure limits is detailed in the July 2021 Activity Hazard Analysis (Attachment A).

Task 2.2: Soil and Groundwater Assessment Approach

- Temporary Boring Utility Clearance.** The temporary boring installations will be completed in accordance with the Work Plan. The ground surface of the assessment area is composed primarily of 24-inch-thick

reinforced concrete. ATI will review and identify all utilities in the area before any wells are located at the Site. ATI will mark the location of utilities on the ground before concrete coring to allow installation of the borings by the drillers.

Boring locations will be air-knifed to approximately 5 feet below ground surface (bgs) to ensure no subsurface utilities are intercepted during drilling. Based on historical data collected for profiling excavation spoils during installation of infrastructure throughout the Site over time, impacts in areas shallower than 5 feet from historical operations at the ASA are not anticipated. As such, no logging of air-knifed soils will be conducted.

- **Temporary Boring Placement.** ATI will advance at least 9 temporary vertical borings and potentially angled borings in the yellow General Boring Investigation Area shown in Figure 3. Initial boring locations in the General Boring Investigation Area have been selected based on the historical TCA concentrations indicating the potential presence of DNAPL. Tables and figures documenting historical soil and groundwater concentrations that are indicative of DNAPL are provided in Attachments B, C and D of this TM. Subsequent boring locations will be dependent on the real-time data obtained from a mobile laboratory. Step-out borings from potential DNAPL detection locations (groundwater concentrations greater than 1 percent of CVOC constituent water solubility limits) shall be approximately 30 feet from the original boring locations unless there is an existing boring or infrastructure that limits delineation. However, these distances will be determined in the field based on laboratory results and project schedule. The primary objective and rationale in determining boring placement will be to determine the furthest extent of DNAPL present. If DNAPL is not detected in one or more of the step-out borings and sufficient field time remains, borings will be advanced in a location halfway between the initial boring(s) and the step-out boring(s) to further refine the DNAPL plume extent.

Proposed initial temporary boring locations are shown in Figure 3. The final boring locations will be marked in the field, accounting for project logistics, location of utilities, and ATI operations.

- **Temporary Boring Installation.** Borings will be advanced to the top of the Spencer Formation (approximately 15 to 17 feet bgs, dependent on location) using Geoprobe direct-push technology with 2.25-inch drill rods. Soils from the borings below 5 feet bgs will be continuously logged according to the Unified Soil Classification System (USCS; ASTM, 2017) under the supervision of a geologist, and will be examined visually and with a PID for evidence of DNAPL or elevated CVOC concentrations. Soil samples for on-site mobile laboratory analysis of CVOCs may be collected if unsaturated zone soil exhibits evidence of significant impacts. Soil collection and analysis will likely be limited to vadose zone soil with indications of significant impacts based on visual observations, PID readings, hydrophobic dye tests, and UV fluorescence field screening.

Soil and groundwater samples will first be assessed in the ASA courtyard area where a potential DNAPL plume has been previously identified. Once the extent of the ASA DNAPL plume has been defined, additional soil and groundwater samples in the PW-98A area will be assessed to determine whether an additional source area is present in this location.

- **Soil Sample Analysis.** Soil samples will be collected as warranted based on field observations and analyzed for CVOCs by EPA Method 8260B at a mobile laboratory.
- **Temporary Boring Groundwater Sampling.** Following installation of a temporary boring, a 48-inch long, 1.25-inch-diameter screen will be installed in the bottom of the borehole to keep the borehole open in the event of a collapse. The outer drill rods will be retracted approximately 2 feet (thereby collecting a groundwater sample at the interface of the Linn Gravels and the Spencer Formation), and the sampling screen will be exposed. Select temporary well locations may be completed as permanent wells to be used as source area and/or delineation wells for future monitoring. The number and location of the wells that may be converted to permanent wells will be determined in the field and will be based on field observations and laboratory analytical results.

- **Groundwater Sample Analysis.** Groundwater samples will be collected in accordance with the Work Plan and analyzed for CVOCs by EPA Method 8260B at a mobile laboratory. In addition, in areas of suspected DNAPL, hydrophobic dye tests and UV fluorescence field screening will be utilized to visually inspect the groundwater for the presence of DNAPL.
- **Boring Abandonment and Decontamination.** Temporary borings will be abandoned within 72 hours of initial construction, in accordance with Oregon regulations.³ Drill rods and reusable well screens will be cleaned at the Site, when appropriate, using a brush and an Alconox and tap water wash solution. Equipment will be rinsed with tap water and then steam cleaned inside and out. The cleaned equipment will be stored on clean storage racks for reuse. All water produced during drill rod and well screen decontamination will be drummed.

Task 2.3: DNAPL Evaluation and Characterization

The distribution of DNAPL is typically highly variable in subsurface media; therefore, multiple lines of evidence are required to identify the potential presence or absence of DNAPL and, if present, whether it is pooled or ganglia. The methods described below will be employed to provide data to determine the distribution of potential DNAPL at the Site and, if present, its nature.

- **PID Screening.** Vadose zone and saturated zone soil from each boring will be screened with a PID (i.e., ppbRAE equipped with an 11.7 eV lamp) at approximately 1-foot intervals. Soils collected from screening intervals exhibiting PID readings greater than 500 parts per million (ppm) will be evaluated using a hydrophobic dye test and UV fluorescence field screening.
- **Hydrophobic Dye Test.** Hydrophobic dyes will partition into DNAPL, imparting a red color to the organic liquid. The hydrophobic dye technique will include the jar shake test, in which a soil or water sample is placed into a jar with a small amount of dye. If the liquid in the jar turns red, DNAPL is assumed to be present.
- **UV Fluorescence Field Screening.** Soils and water containing high concentrations of polycyclic aromatic hydrocarbons (PAHs) will fluoresce when examined under UV light, indicating DNAPL may be present. In addition to the hydrophobic dye test, samples collected from screening intervals exhibiting PID readings greater than 500 ppm may also be evaluated using UV fluorescence field screening.
- **Visual Observation.** DNAPL can exist in mobile (pooled) and immobile (ganglia/droplets) phases. In portions of the Site where groundwater concentrations exceed 1 percent of the constituent water solubility, determine the nature of the DNAPL identified, the temporary wells will be left in place for up to 24 hours and evaluated for the presence of pooled (mobile) DNAPL. If DNAPL is identified at the bottom of a temporary well, it will then be gauged using a decontaminated non-aqueous phase liquid (NAPL)-water interface probe and/or new disposable weighted bottom loading bailer to measure the thickness of pooled DNAPL.
- **Mobile Laboratory.** Soil and groundwater samples will be collected from select intervals and boring locations where potential DNAPL has been indicated. These samples will be analyzed for CVOCs by the on-site mobile laboratory in accordance with Method 8260B.
- **DNAPL Presence.** DNAPL is likely when groundwater concentrations are greater than 1 percent of the constituent effective solubility. Despite the presence of DNAPL, concentrations exceeding 10 percent of the solubility are rarely encountered. For this investigation, the percentages for TCA are shown below in Table 2 in micrograms per liter ($\mu\text{g}/\text{L}$).

³ Oregon Administrative Rule (OAR) 690-240.

Table 2. Percent Effective Solubility of TCA

Percent of Effective Solubility	TCA (µg/L)
10 %	140,000
3 %	42,000
1 %	14,000

Notes

Based on TCA water solubility of 1,400,000 µg/L (PubChem).

Table references EPA's 1994 Fact Sheet: *DNAPL Site Characterization* (EPA, 1994b).

% = percent

µg/L = micrograms per liter

Task 3: Reporting

A TM will be prepared that presents the findings of the temporary boring investigation, including the soil and groundwater results and the evaluation of the nature and extent of the DNAPL. The TM will be completed and submitted to EPA within 60 days of completing the investigation. ATI will consult with EPA if any further actions are indicated by the results of the soil and groundwater sampling.

3. References

- ASTM. 2017. Standard Practice for Description and Identification of Soils (Visual-Manual Procedures). (West Conshohocken, PA: ASTM International). www.astm.org
- EPA. 1994a. *Record of Decision Declaration, Decision Summary, and Responsiveness Summary for Final Remedial Action of Groundwater and Sediments Operable Unit, Teledyne Wah Chang Albany Superfund Site, Millersburg, Oregon*. Prepared by U.S. Environmental Protection Agency, June 1994.
- EPA. 1994b. Fact Sheet: DNAPL Site Characterization. Prepared by U.S. Environmental Protection Agency, September 1994.
- EPA. 2009. *Ground Water Issue: Assessment and Delineation of DNAPL Source Zones at Hazardous Waste Sites*. Prepared by U.S. Environmental Protection Agency, September 2009
- Geosyntec. 2009. Design Investigation and Remedy Selection Report, Draft Final. Prepared by Geosyntec Consultants, March 2009.
- GSI. 2021. *Revised Acid Sump Area Source Area Remedial Design Work Plan, ATI Millersburg Operations Facility, Millersburg, Oregon*. Prepared by GSI Water Solutions, Inc., February 2021.
- ITRC. 2003. An Introduction to Characterizing Sites Contaminated with DNAPLs. Prepared by The Interstate Technology & Regional Council Dense Nonaqueous Phase Liquids Team, September 2003.
- ITRC. 2015. Integrated DNAPL Site Characterization and Tools Selection. Prepared by The Interstate Technology & Regional Council, April 20, 2015.
- PubChem. Compound Summary 1,1,1-Trichloroethane. Hosted by the National Library of Medicine, National Center for Biotechnology Information. Accessed July 7, 2021.
https://pubchem.ncbi.nlm.nih.gov/compound/1_1_1-Trichloroethane.

Figures

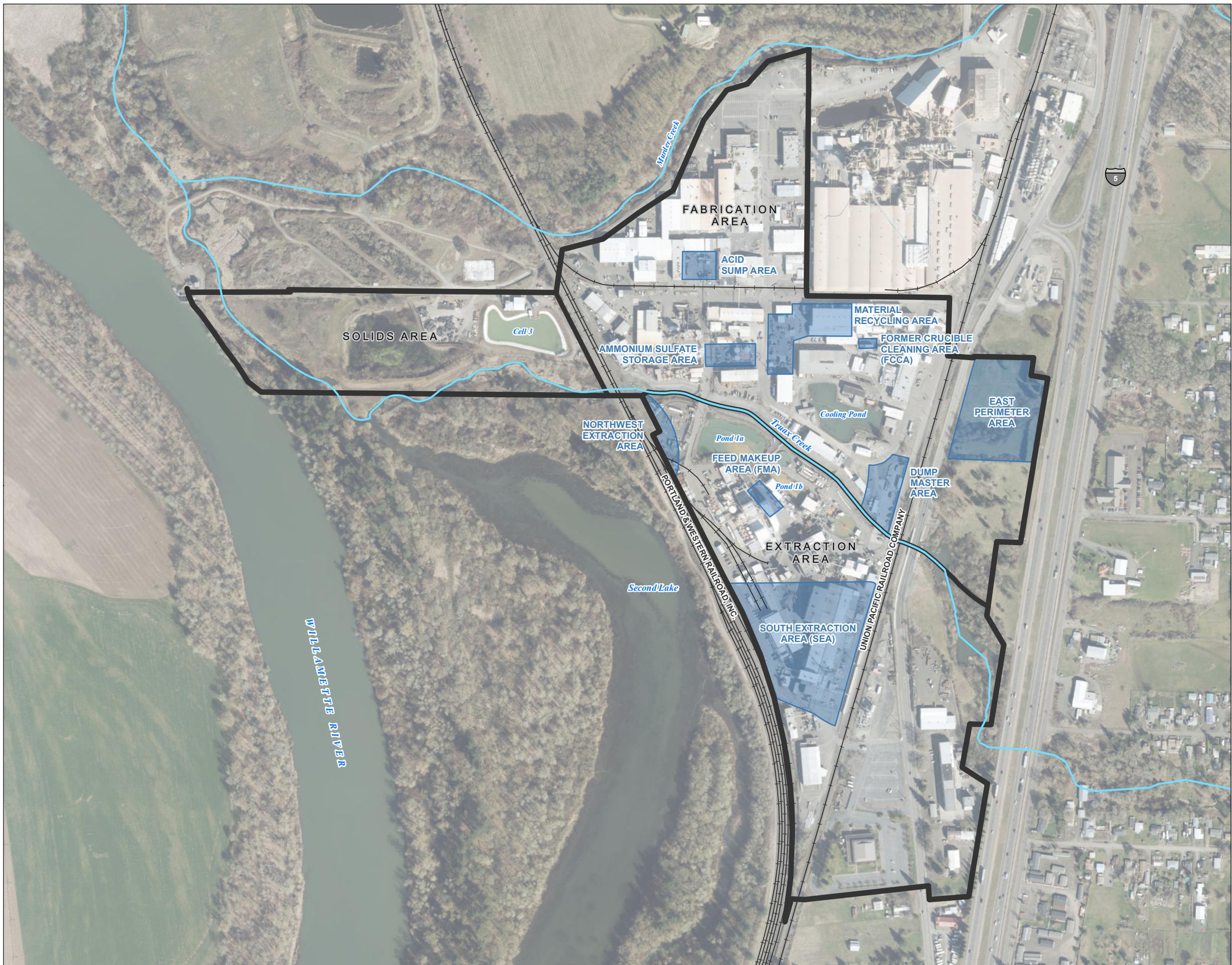
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FIGURE 1

Millersburg Operations

Main Plant and Solids Area

ATI Millersburg Operations, Oregon



Date: March 18, 2021

Data Sources: Linn Co., ESRI, Digiglobe 2018



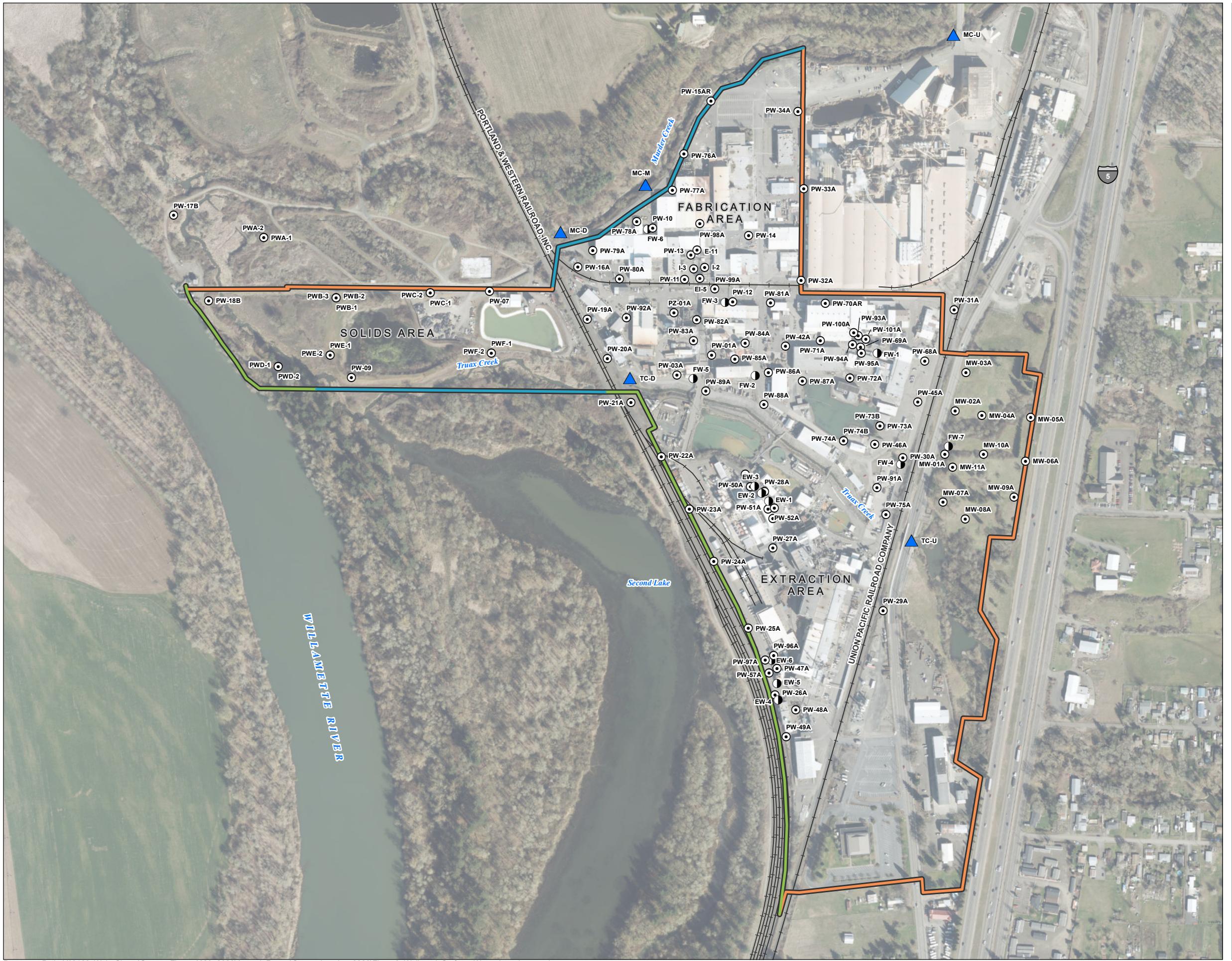


FIGURE 2

Well and Surface Water Locations in the Main Plant and Solids Area

LEGEND

- Monitoring Well
 - Extraction Well
 - ▲ Surface Water Sample Location

Property Boundary

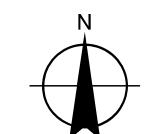
- AWQC for Aquatic Receptors
 - AWQC for Human Health and Fish Consumption
 - Groundwater MCL

All Other Features

- +— Railroad

NOTES

NOTES
AWQC: Ambient Water Quality Criteria, Oregon
Department of Environmental Quality
MCL: Maximum Contamination Level, U.S.
Environmental Protection Agency's Drinking Water
Regulation

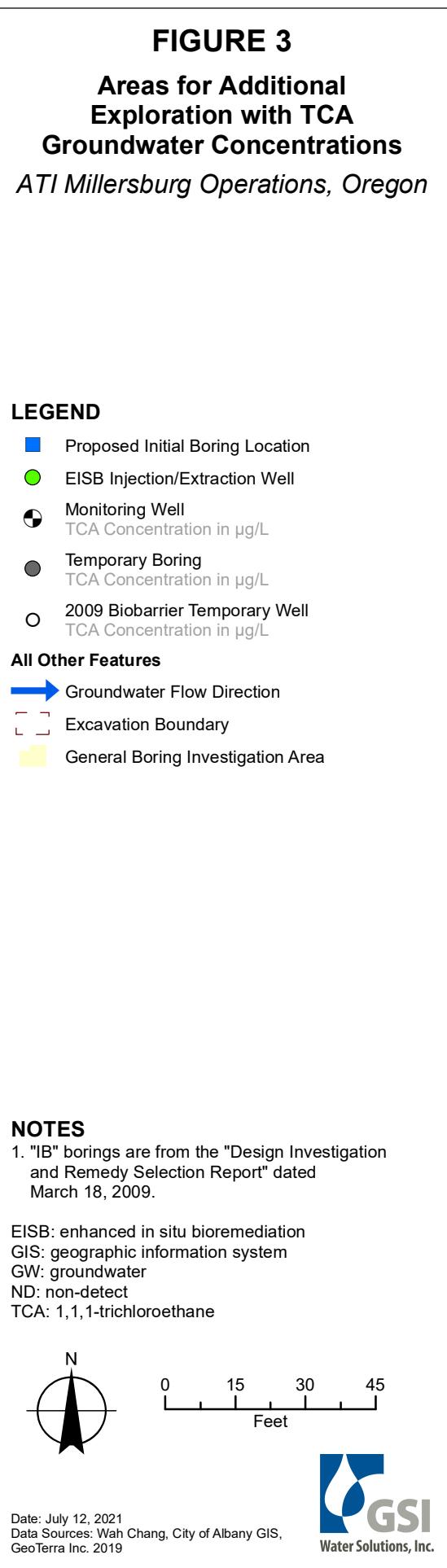
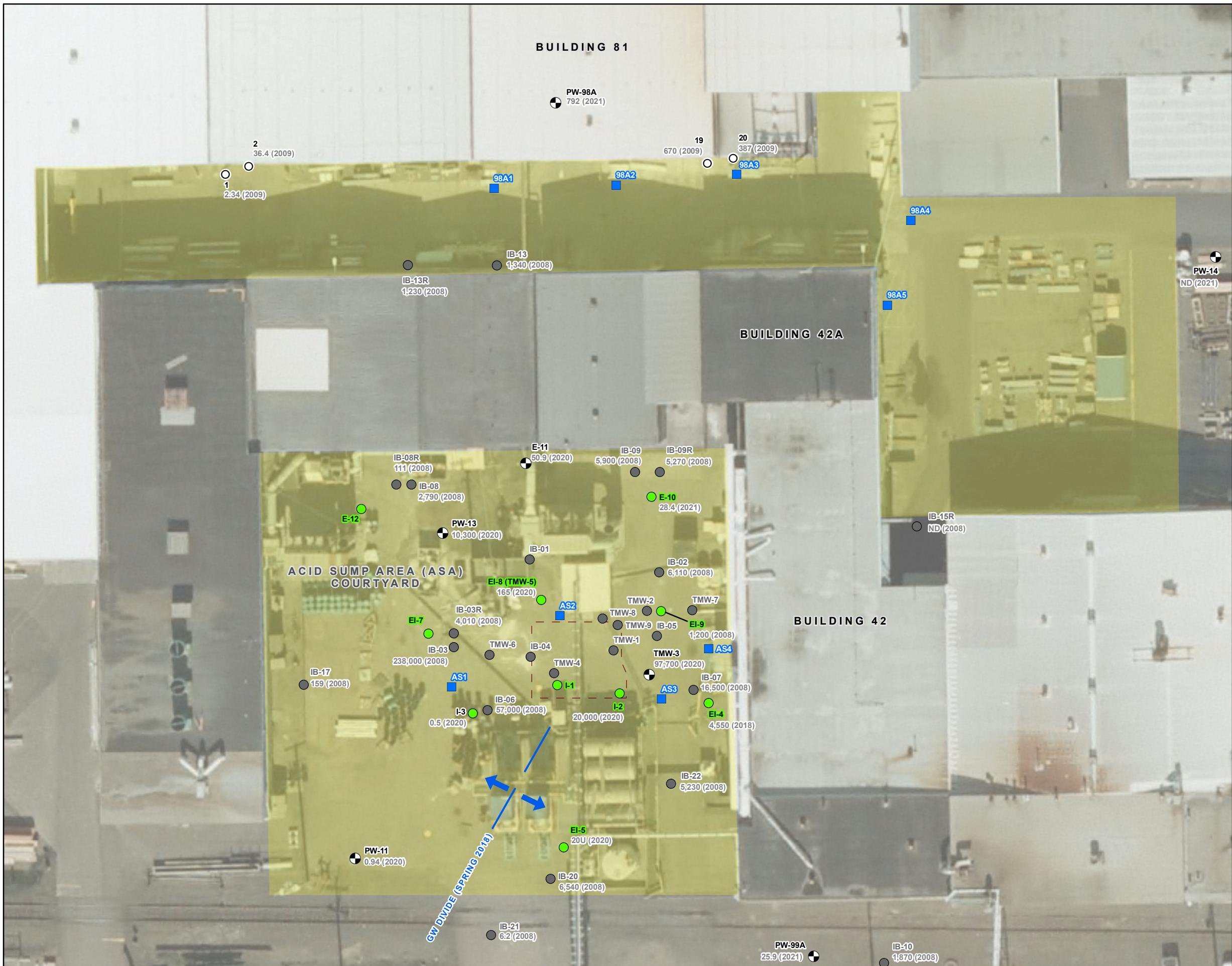


A horizontal number line starting at 0 and ending at 675. The numbers 225, 450, and 675 are marked on the line. Below the line, the word "Feet" is written.



FIGURE 3
Areas for Additional Exploration with TCA Groundwater Concentrations

ATI Millersburg Operations, Oregon



Attachment A

Activity Hazard Analysis

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ACTIVITY HAZARD ANALYSIS

ACTIVITY: Drilling and Soil Logging

PROJECT: ATI Acid Sump Investigation

DATE: July 2021

WORK DESCRIPTION: Drilling oversight, screening soil for DNAPL, and soil logging

SITE SUPERVISOR: Renee Fowler

SITE SAFETY OFFICER: TBD

Work Activity Sequence Describe the steps and sequence.	Potential Health and Safety Hazards Analyze each step for potential hazards.	Hazard Controls Develop controls for each potential hazard.
	Inhalation of contaminants	<ul style="list-style-type: none">Air quality will be monitored using a photoionization detector (PID) and Draeger tubes to determine if respirators with organic vapor cartridges are necessary and if the exclusion zone should be expanded.
Soil logging and DNAPL screening	Ingestion of contaminants, skin/eye contact with contaminants	<ul style="list-style-type: none">Wear appropriate personal protective equipment (PPE) (i.e., safety glasses, mask, and/or gloves) to prevent or reduce exposure.Move exposed person away from source of contamination and rinse mouth if contaminant has been ingested.If exposure to skin occurs, promptly wash contaminated skin using soap or mild detergent and water.Rinse eyes with large amounts of water.
	Cuts or incisions from opening and handling sample liner	<ul style="list-style-type: none">If possible, have drilling contractor open plastic sample liners.Cut away from body when opening plastic liners.Use specialized core-cutting tool or table, if available.Avoid cutting on unstable surfaces, in unstable positions, or at awkward anglesUse a vise or some other form of securing liner rather than hands while cutting. If hands are required, never hold liner in front of direction of blade.
	Muscle strain/injuries	<ul style="list-style-type: none">Use proper lifting techniques or ask for assistance with heavy objects.Evaluate weight and center of gravity of heavier items prior to lifting/moving.

Work Activity Sequence Describe the steps and sequence.	Potential Health and Safety Hazards Analyze each step for potential hazards.	Hazard Controls Develop controls for each potential hazard.
Soil logging and DNAPL screening	<p>Heat Stress</p> <p>UV Exposure</p>	<ul style="list-style-type: none"> Where possible, shift work hours to cooler times of the day. Allow frequent and adequate rest periods, adequate fluid intake, and monitor employees for signs of thermal stress. Wear clothing suitable for the current weather conditions. To avoid heat stress, cool potable water will be readily available, and site personnel will be encouraged to drink plenty of fluids and take periodic work breaks in hot weather. Wear appropriate clothing, hats, and sunscreen to prevent sunburn.
	Rotating and moving equipment	<ul style="list-style-type: none"> Set up soil logging station in area well clear of drill rig and drilling activities, and at an upwind location, if possible. Stay clear of drill rig while drill rig is in operation. If there is a need to approach drill, ensure drillers have stopped and secured rotating machinery before approaching and have approved getting close to the drill
	Traffic	<ul style="list-style-type: none"> Use methods such as cones, signs, lights, caution tape, etc., to divert and slow vehicle traffic near work site. Set a perimeter around drilling operation to prevent pedestrian traffic (outside persons) from entering work zone.
Drilling activities	Moving support vehicles or forklifts	<ul style="list-style-type: none"> Set up soil logging station in area well clear of moving vehicles and work zones.
	<p>Overhead hazards</p> <p>Subsurface Utilities</p> <p>Call the Oregon Utility Notification Center "One Call" system at 1-800-332-2344 at least 2 full business days before conducting subsurface work. http://www.digsafelyoregon.com/faqs.asp#1</p>	<ul style="list-style-type: none"> Become familiar with overhead hazards associated with each drill rig. Pay attention to loads being moved by cables and pulleys. Ensure overhead powerlines are not in the vicinity of work activities prior to extending drill rig mast. Check for location of underground services before beginning ground-penetrating work. OSHA regulations require the estimated location of utility installations (sewer, telephone, fuel, electric, water lines) or any other underground installations that reasonably may be expected to be encountered during excavation work, will be determined before opening an excavation. Use a service locator and the following cues to assist in identifying possible underground services: (1) signs of patched or missing of pavement, (2) service boxes, pits, and manholes as they may indicate the presence or alignment of services, and (3) note services coming into or out of the ground, like power lines and down spouts. When possible, shut off utilities that are in the area while drilling is taking place.

Work Activity Sequence Describe the steps and sequence.	Potential Health and Safety Hazards Analyze each step for potential hazards.	Hazard Controls Develop controls for each potential hazard.
Drilling activities	Tension hazards	<ul style="list-style-type: none"> • Drillers will be air-knifing using vac-truck to a depth of 4 to 5 feet below surface for physical confirmation of absence/presence of utilities.
	Weather	<ul style="list-style-type: none"> • Be mindful of cables, ropes, and straps that are under tension. Stand sufficiently back from operating equipment to prevent whiplash hazards from snapped cables or hydraulic lines.
	Noise exposure	<ul style="list-style-type: none"> • Rigging masts should not be extended during high-wind conditions when there is a potential for tipping hazards • Wear hearing protection in high noise environments or when around heavy machinery or equipment.
	Slips, trips, and falls	<ul style="list-style-type: none"> • Ensure that hearing protection is available. • Stay clear of drilling contractor work zones, if possible. • Walk around equipment cables and hoses rather than over. If not possible, cover cables and hoses with a walking platform or mark trip hazards. • Maintain good housekeeping practices.

Air Quality Monitoring

Air quality will be monitored during drilling and soil processing for volatile organic compounds. This includes:

- Photoionization detector (PID)
- Draeger tubes

PIDs will be in the Support Zone(s) (SZ), such as near the soil processing area and observation area, and the Exclusion Zone. Upon PID detections, Draeger tubes will be used to identify and/or eliminate constituents of concerns in the air. The table below provides the OSHA PEL (regulatory exposure limits), which will be used to determine if respirators with organic vapor cartridges are required and if the EZ should be expanded to protect personnel in the SZ. The table also provides the ACGIH TLVs (recommended exposure limits), which will be taken into consideration when determining if respirators with organic vapor cartridges are required and if the EZ should be expanded to protect personnel in the SZ.

Air Quality Exposure Limits^{1,2}

COC	OSHA PEL (Regulatory Limit)	ACGIH TLV (Recommended Limit)
Tetrachloroethene	25 ppm	25 ppm
Trichloroethene	25 ppm 100 ppm (short term exposure limit)	10 ppm 25 ppm (short term exposure limit)
1,1-dichloroethene ³	None ³	5 ppm
Vinyl chloride	1 ppm	1 ppm
1,1,1-trichloroethane	350 ppm 450 ppm (short term exposure limit)	350 ppm 450 ppm (short term exposure limit)
1,1-dichloroethane	100 ppm	100 ppm

¹ Exposure limits will be used to determine if respirators are required and if the exclusion zone should be expanded.

² Exposure Limits are sourced from OSHA PEL Annotated Tables: <https://www.osha.gov/annotated-pels>.

³ OSHA PEL for 1,1-dichloroethene (or vinylidene chloride) was repealed in 1993 ([NIOSH Pocket Guide to Chemical Hazards, Appendix G](#)).

ACGIH: American Conference of Governmental Industrial Hygienists PEL: permissible exposure limit, an 8-hour time weighted average unless otherwise noted

COC: contaminant of concern

TLV: threshold limit value, an 8-hour time weighted average unless otherwise noted

OSHA: Oregon Occupational Safety & Health

Escape Route from Acid Sump Area to outside the Facility

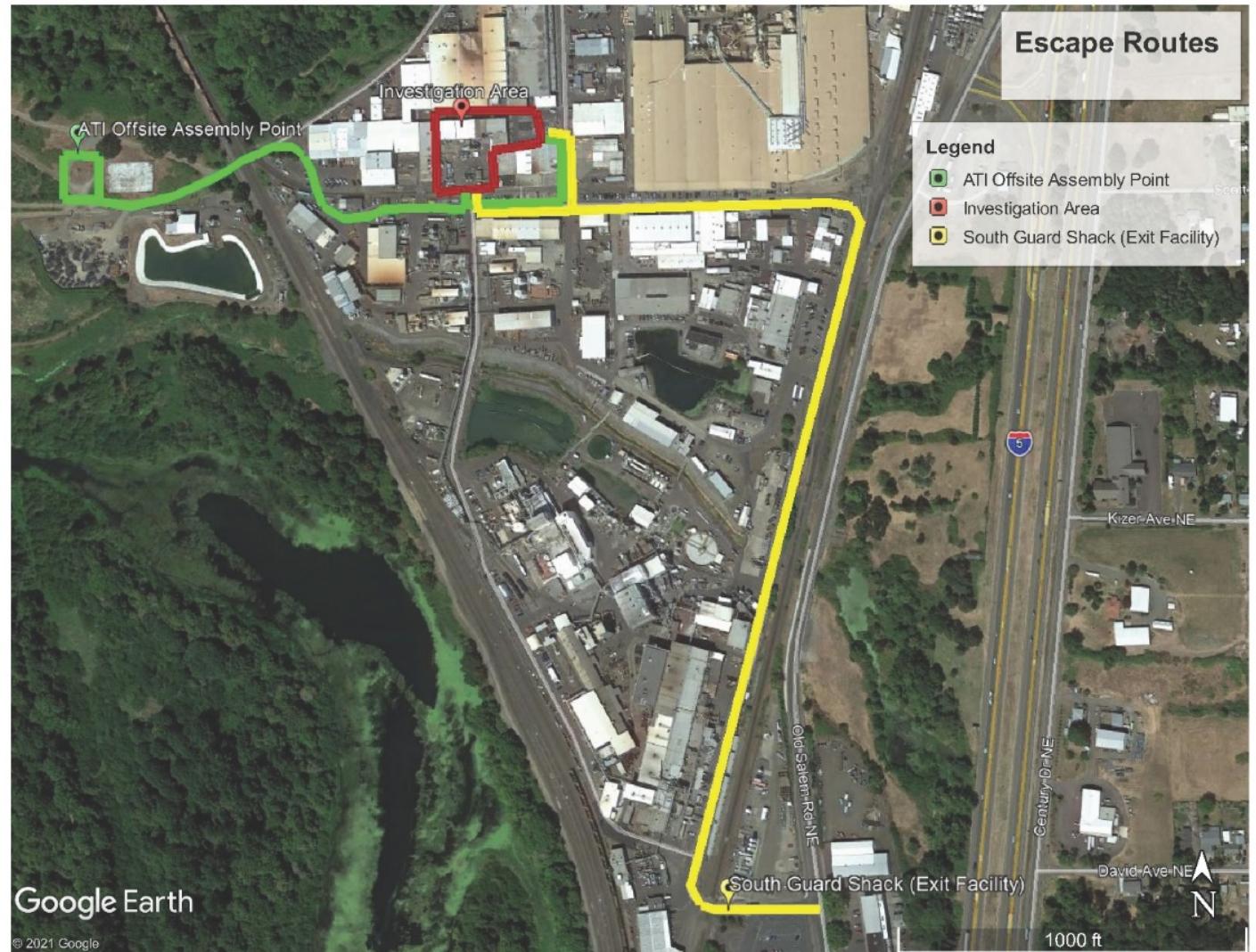
In case of an emergency, there are two courses to leave the Investigation Area. **If unfamiliar with the Site, the best course of action is to follow what ATI employees are doing.**

ATI Offsite Assembly

As discussed in the Site's safety training video, if the Site alarm blasts 3-3 then everyone needs to meet at the nearest assembly area. The closest assembly area is in the Solids Area (see green line in image on right).

Exiting the Facility

All Site visitors must enter and exit through the South Gate (see image on right). From the Investigation Area, head west, or south then west, to get on the main road that goes along the eastern perimeter of the Site (see yellow line in image on right).



Task-Specific Equipment

Modified Level D:

- metatarsal boots or steel-toe boots with metatarsal guards (ASTM F2413)
- hi-viz safety vest (ANSI 107)
- safety glasses (ANSI Z87.1)
- hard hat with company logo (ANSI Z89)
- hearing protection

Depending on activity, the following PPE may also be required:

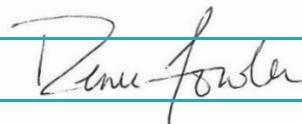
- respirator with organic vapor cartridges

Air Quality:

- PID
- Draeger tubes

APPROVED/ANALYZED BY: Renee Fowler

SIGNATURE:



DATE: July 6, 2021

Print Name	Signature	Date	Print Name	Signature	Date

Attachment B

Groundwater Data

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Table B-1. Groundwater CVOC Results at Permanent Wells

ATI Millersburg Operations, Oregon

Cleanup Level	TCA (µg/L)							DCA (µg/L)							PCE (µg/L)						
	200							3,700							5						
	2018		2019		2020		2021	2018		2019		2020		2021	2018		2019		2020		2021
Well	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Spring	Fall	Spring	Fall	Spring	Fall	Spring
Acid Sump Wells																					
E-11	9.39	7.71	8.08	8.88		50.9		2.86	2.47	2.02	2.34		29		0.2 U	0.2 U	0.4 U	0.4 U		0.34 J	
EI-4	5,410	4,550						4,940	3,620						9.7	40 U					
EI-5	766	90.2 J	144	10.0 U		40.0 U		572	169	148	22.8		352		2 U	50 U	20 U	10 U		40.0 U	
EI-9	12,000	1,200						10,500	1,880						40 U	20 U					
E-10						28.4								59.6							2 U
FW-3	4.92	4.51	186	0.893	119	23.5	13.2	5.13	5.45	63.5	1.48	50.8	50.5	37.8	0.2 U	0.2 U	1.43	0.4 U	0.880	0.480	0.34
I-2	25,100	38,400	31,400	22,900		20,000		13,200	17,600	12,200	17,600		13,300		20.5	29 J	80 U	31 J		200 UJ	
I-3	1,800	5.44	62.4	0.332 J		0.500		103	12.5	12.1	1.150		0.680		2.5 J	0 U	1.7	0.400 U		0.400 U	
PW-11	9.78	8.03	3.00	1.710		0.940 J		4.09	7.87	2.35	1.670		0.840 J		0.392 J	0.43	0.25 J	0.400 U		0.400 UJ	
PW-12	640	504	6.8	149	36.2	666	721	124	99.7	6.07	30.6	11.5	240	350	2.66	2.6 J	0.4 U	0.841	0.330 J	4.58	4.97
PW-13	92.4	68.5	2,080	3,960		10,300		2,670	1,710	2,300	3,190		5,310		10 U	4 U	8 U	8 U		6.80	
PW-14						0.2 U								0.2 U							0.2 U
PW-98A	894	2,600	466	474	335	1,970	792	515	1,170	326	399	224	432	257	4.7	14.2	2.85	2.24 J	2.8 J	12.7	6.5
PW-99A	70.6	54.7	41.5	13.2	19.0	25.9	17.5	68.2	76.2	37.4	17.2	27.8	52.9	43.8	0.786	2 U	2 U	1 U	0.39 J	0.68 J	1
TMW-3	232,000	180,000	85,600	125,000		97,700		62,800	61,400	40,300	56,600		40,900		104	104 J	140 J	126		135	
TMW-5	20.3	200 U	200 U	345		165		516	2540	1,450	5,400		4,120		2.5 J	200 U	200 U	100 U		100 U	

Notes

Bold indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action Table B-4 for more details (GSI, 2015).

µg/L = microgram per liter

DCA = 1,1-dichloroethane

DCE = 1,1-dichloroethene

J = estimated value

PCE = tetrachloroethene

TCA = 1,1,1-trichloroethane

TCE = trichloroethene

U = not detected above reporting limit

UJ = not detected above reporting limit; however, the reported detection limit is estimated

VC = vinyl chloride

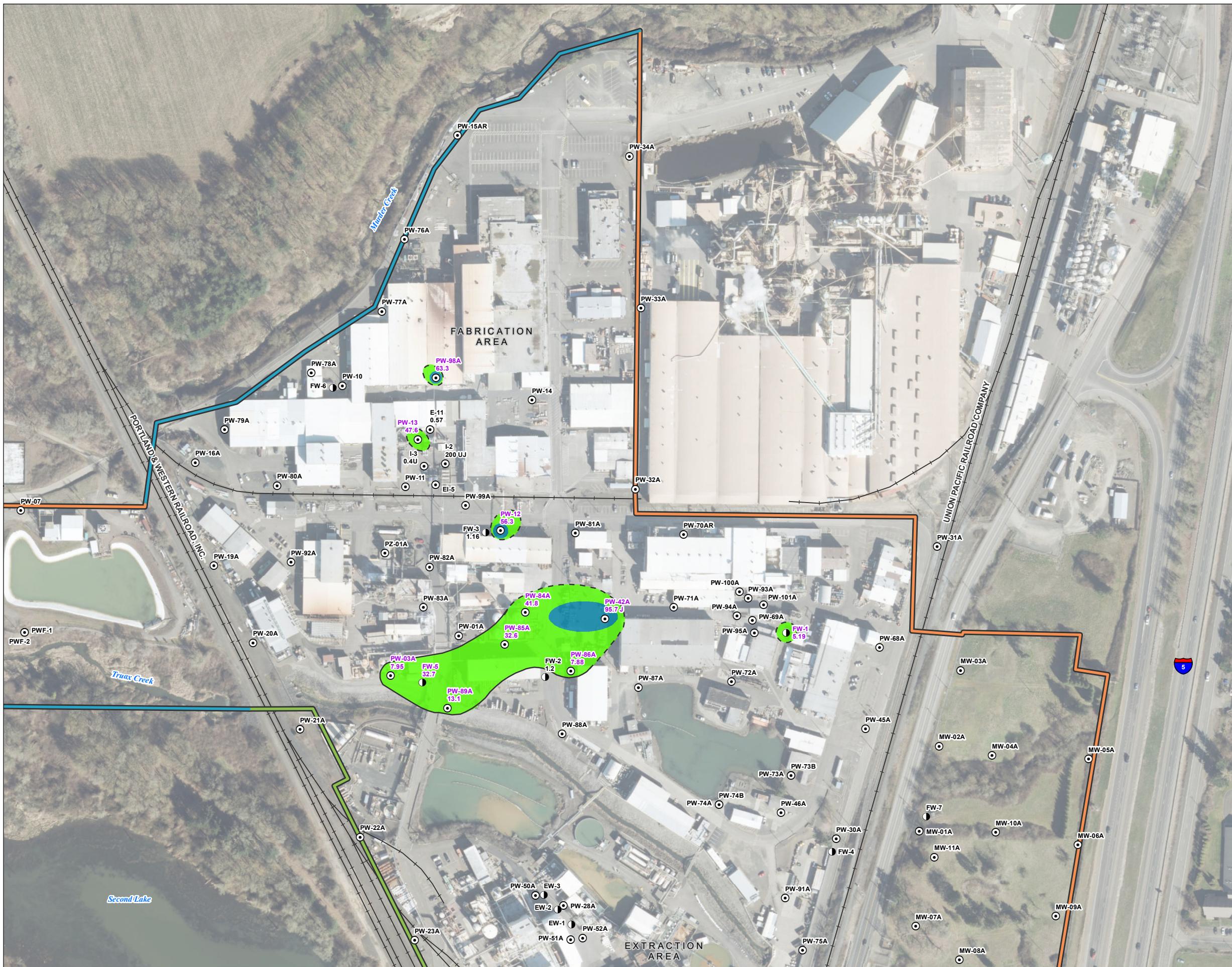
Table B-1. Groundwater CVOC Results at Permanent Wells

ATI Millersburg Operations, Oregon

Cleanup Level	TCE (µg/L)							DCE (µg/L)							VC (µg/L)							
	5							7							2							
	2018		2019		2020		2021	2018		2019		2020		2021	2018		2019		2020		2021	
Well	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Spring	Fall	Spring	Fall	Spring	Fall	Spring	
Acid Sump V																						
E-11	0.2 U	0.2 U	0.4 U	0.4 U		0.57		13	15.3	13	15.3		77		0.53	0.73	0.44	0.76		4.93		
EI-4	13.1	54.8 J						677	612						802	719						
EI-5	3 J	50 U	20 U	10 U		40.0 U		212	50 U	48.5	10 U		31.0 J		93.5	52.5 J	26.5	10 U		28.0 J		
EI-9	59.4 J	20 U						4,210	903						84.8	211						
E-10						2 U									312							73.4
FW-3	0.23 J	0.241 J	7.17	0.4 U	8.17	1.160	0.75	1.52	1.66	97.7	0.274 J	59.9	128	91.1	0.2 U	0.2 U	7.5	0.4 U	3.97	3.23	1.32	
I-2	84.5	83.3	110	68		200 UJ		2,110	3,050	2,990	3,290		3,440		543	682	560	724		520		
I-3	7.8	0.297 J	0.47	0.400 U		0.400 U		1,830	52.4	95.6	3,960		5.00		173	10.7	156	0.381 J		0.300 J		
PW-11	0.32 J	0.63	0.2 J	0.400 U		0.400 UJ		7.92	21.6	3.61	2,460		0.53 J		0.2 U	0.21 J	0.4 U	0.400 U		0.400 UJ		
PW-12	20.2	19.4	7.23	10.8	6.85	56.3	36.6	155	120	15.6	39	17.4	185 J	355	14.6	11.8	2.36	3.35	4.86	19.6	26.8	
PW-13	13.8 J	10.1	18	24		47.6		525	379	588	878		1,360		10 U	4 U	4 J	5 J		8.80		
PW-14						0.2 U								0.2 U							0.2 U	
PW-98A	32.1	44.6	21.8	20.7	22.7	63.3	62	1,120	2,830	772	830	494	1,610	939	110	196	93.6	99.5	53.8	61.2	56.8	
PW-99A	1.93	2.6 J	1.35 J	0.6 J	0.79	1.26	1.35	773	516	368	139	174	247	299	2.02	2.4 J	1.6 J	0.6 J	1.06	1.06	1.05	
TMW-3	820	660	530	546		495		21,200	17,100	11,500	14,400		13,000		2550	2640	1,760	2,290		2,100		
TMW-5	2 U	200 U	200 U	100 U		100 U		13.2	200 U	200 U	88 J		100 U		167	8030	2,300	5,570		5,260		

FIGURE B-2**TCE Isopleth in Fall 2020**

ATI Millersburg Operations, Oregon

**LEGEND**

- Monitoring Well
Fall 2020 TCE Concentration in µg/L
- Extraction Well
Fall 2020 TCE Concentration in µg/L

Fall 2020 TCE Concentrations (µg/L)

5 - 50

> 50

TCE Concentration Boundary (dashed where inferred)

Property Boundary

AWQC for Aquatic Receptors, Standard: 21,900 µg/L

AWQC for Human Health and Fish Consumption, Standard: 1.4 µg/L

Groundwater MCL, Standard: 5 µg/L

All Other Features

Railroad

NOTES

Wells without a displayed concentration were below the cleanup level in Fall 2020.
Cleanup Level = 5 µg/L

AWQC: Ambient Water Quality Criteria, Oregon Department of Environmental Quality

MCL: Maximum Contamination Level, U.S. Environmental Protection Agency's Drinking Water Regulation

TCE: trichloroethene

U: not detected above reporting limit

J: estimate

µg/L - micrograms per liter

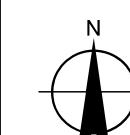
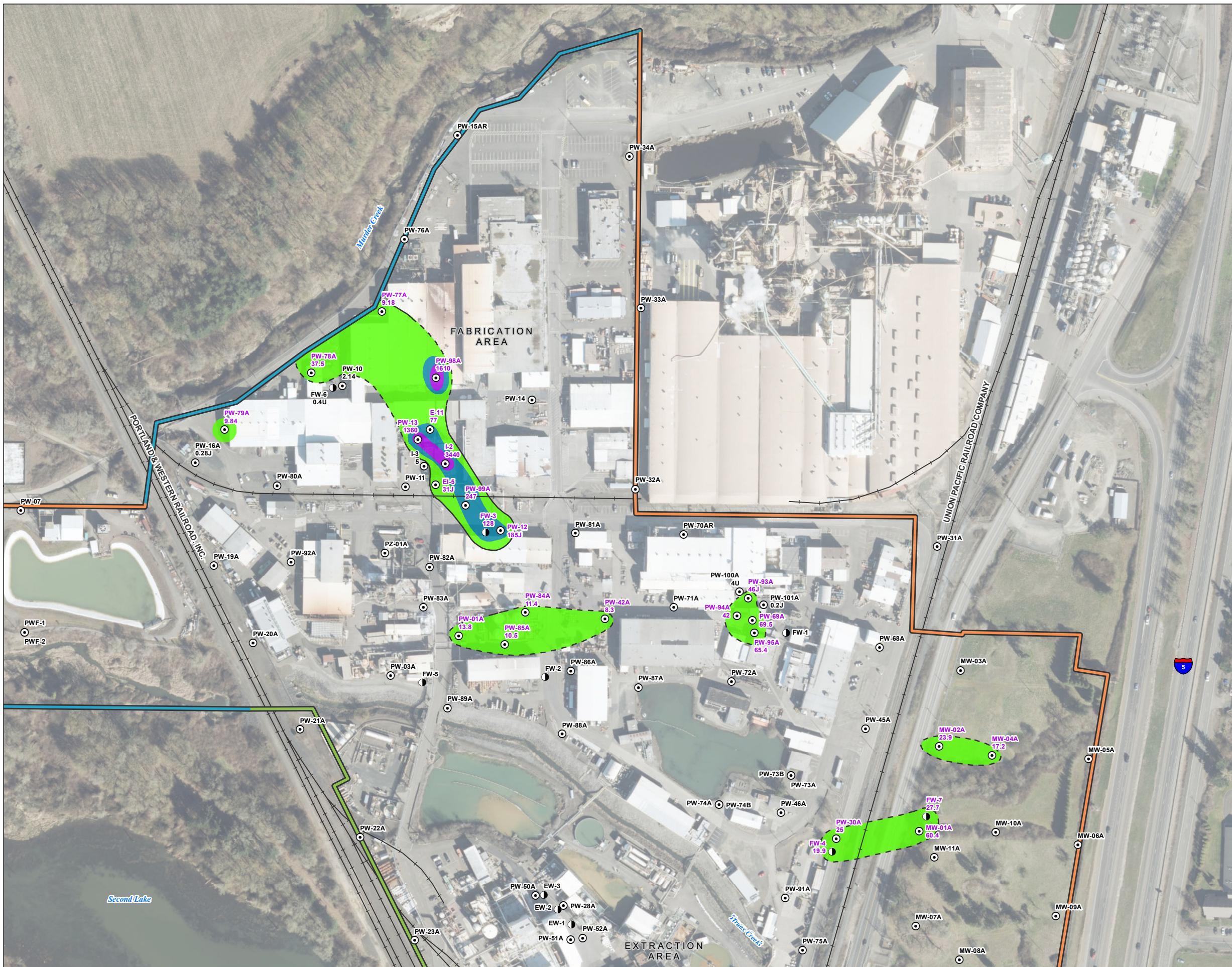
0 115 230 345
Feet

FIGURE B-3

DCE Isopleth in Fall 2020

ATI Millersburg Operations, Oregon

**LEGEND**

- Monitoring Well
Fall 2020 DCE Concentration in µg/L
- Extraction Well
Fall 2020 DCE Concentration in µg/L

Fall 2020 DCE Concentrations (µg/L)

- | |
|----------|
| 7 - 70 |
| 71 - 700 |
| > 700 |

DCE Concentration Boundary (dashed where inferred)

Property Boundary

- AWQC for Aquatic Receptors, Standard: 11,600 µg/L
- AWQC for Human Health and Fish Consumption, Standard: 230 µg/L
- Groundwater MCL, Standard: 7 µg/L

All Other Features

- Railroad

NOTES

Wells without a displayed concentration were below the cleanup level in Fall 2020.
Cleanup Level = 7 µg/L

AWQC: Ambient Water Quality Criteria, Oregon Department of Environmental Quality

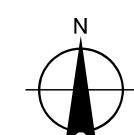
MCL: Maximum Contamination Level, U.S. Environmental Protection Agency's Drinking Water Regulation

DCE: 1,1-dichloroethene

U: not detected above reporting limit

J: estimate

µg/L: micrograms per liter



0 115 230 345
Feet



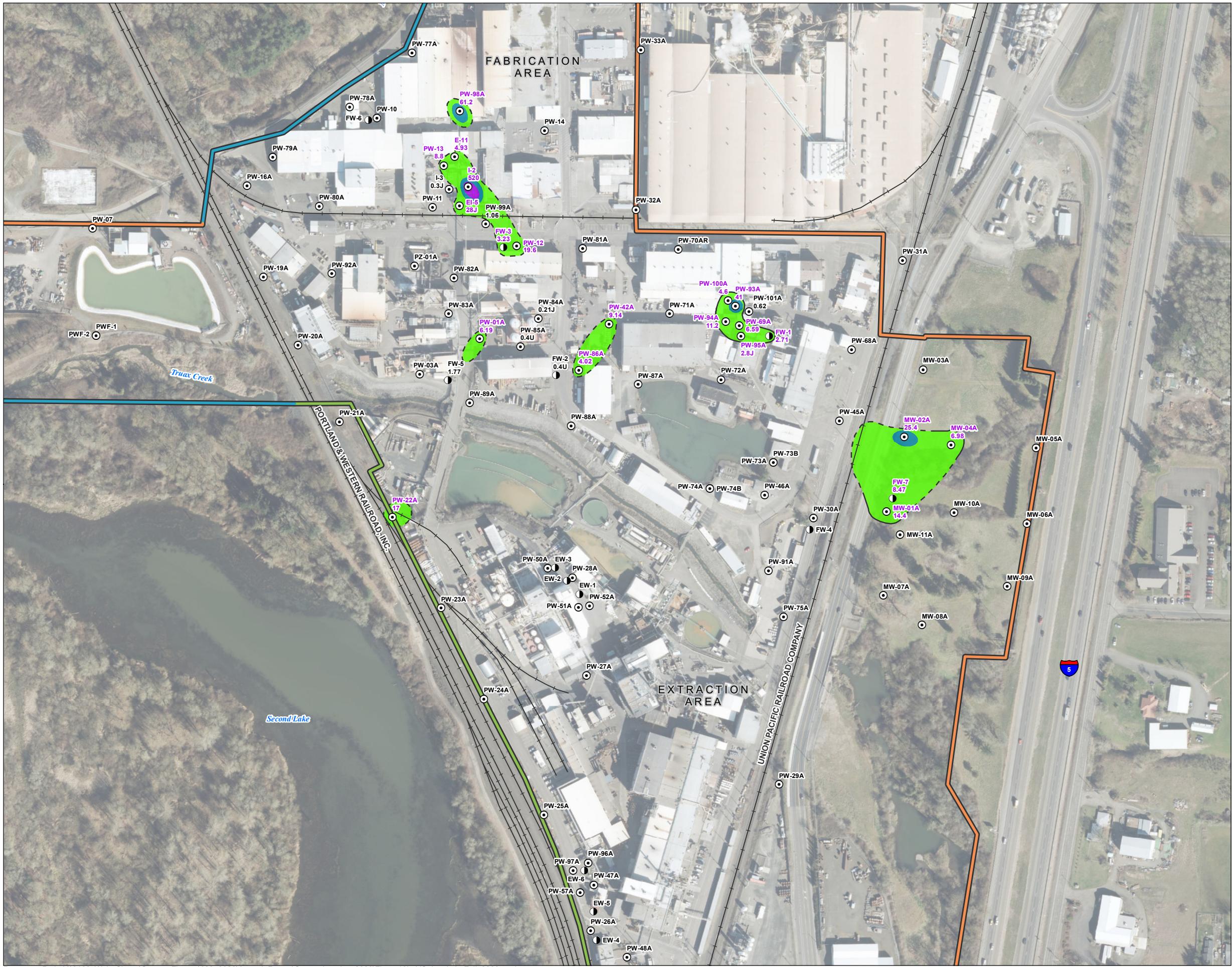


FIGURE B-4
VC Isopleth in Fall 2020
ATI Millersburg Operations, Oregon

LEGEND

- Monitoring Well
Fall 2020 VC Concentration in µg/L
 - Extraction Well
Fall 2020 VC Concentration in µg/L

Fall 2020 VC Concentrations ($\mu\text{g/L}$)

- 2 - 20
21 - 200
> 200

VC Concentration

- where inferred)

Property Boundary

 - AWQC for Aquatic Receptors,
Standard: not established
 - AWQC for Human Health and Fish Consumption,
Standard: 0.023 µg/L
 - Groundwater MCL. Standard: 2 µg/L

All Other Features

- Railroad

NOTES

NOTES
Wells without a displayed concentration were below the cleanup level in Fall 2020.
Cleanup Level = 2 ug/L

AWQC: Ambient Water Quality Criteria, Oregon

AWQC: Ambient Water Quality Criteria, Oregon Department of Environmental Quality

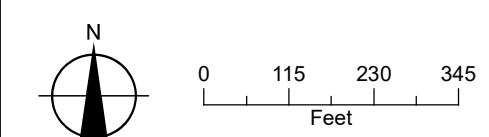
MCL: Maximum Contamination Level, U.S.

Environmental Protection

Regulation

VC: Vinyl Chloride

U: not detected above report
I: estimate



Attachment C

2016 Excavation Sidewall Soil Data

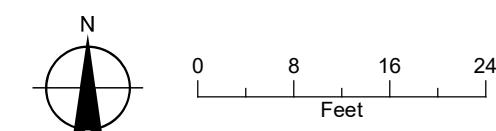
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FIGURE C-1
Excavation Area Layout
ATI Millersburg Operations, Oregon



- LEGEND**
- Existing Monitoring Well¹
 - Excavation Extraction Sump
 - Attempted Extraction Well FW-8
 - ◆ Utility Pole
 - Temporary Beams
 - Work Zone Exclusion Barriers
 - - - Utility Corridor
 - Active Acid Sump Conveyance Corridor
 - Overhead Acid Line
 - Flakeboard Stormline (7-19-16 Video)
 - Approximate Direction of Groundwater Flow
 - Approximate Excavation Area
 - Groundwater Treatment Area

NOTE:
¹I-2, I-3, and EI-5 were added to the groundwater monitoring program to replace I-1, TMW-1, and TMW-4 which were abandoned by excavation.



Date: May 4, 2017
Data Sources: Wah Chang, Aerial photo taken in March of 2010 by the City of Albany



FIGURE C-2
**Soil Sample Locations
and TCA Results**

ATI Millersburg Operations, Oregon



Date: May 9, 2017
Data Sources: Wah Chang, Aerial photo taken in March of 2010 by the City of Albany



Table C-1. Excavation Soil Sampling Results

ATI Millersburg Operations, Oregon

Sample ID ²	Date Sampled	Distance West ¹ (feet)	Distance South ¹ (feet)	Depth (feet)	Quadrant	Chlorinated Volatile Organic Compounds (CVOCs) Method 8260B / SW 5030						
						TCA (µg/kg)	1,1-DCA (µg/kg)	PCE (µg/kg)	TCE (µg/kg)	cis-1,2-DCE (µg/kg)	1,1-DCE (µg/kg)	VC (µg/kg)
AS-1500-06-0816	8/3/16	15	0	6	NE	294,000	16,700	2,880	836	173	2,920	173
AS-1500-12-0816	8/3/16	15	0	12	NE	18,500	1,490	115 U	115 U	115 U	990	115 U
AS-1508-06-0816	8/5/16	15	8	6	NE	5,300	216	69	66.5 U	66.5 U	225	66.5 U
AS-1508-12-0816	8/5/16	15	8	12	NE	1,920	730	73.2 U	73.2 U	73.2 U	1,330	73.2 U
AS-1520-06-0816	8/3/16	15	20	6	SE	7,450	3,160	226	142 U	142 U	151	142 U
AS-1520-12-0816	8/5/16	15	20	12	SE	1,220	460	66.2 U	66.2 U	66.2 U	320	66.2 U
AS-1530-06-0816	8/3/16	15	30	6	SE	56,000	9,340	1,130	431	138 U	2,360	138 U
AS-1530-12-0816	8/3/16	15	30	12	SE	90,400	527	480	144	106 U	13,000	106 U
AS-2205-14.5-0816	8/8/16	22	5	14.5	C	15,900	144	159	67.9 U	67.9 U	488	67.9 U
AS-2220-14.5-0816	8/8/16	22	20	14.5	C	149,000	195	402	479	57.8 U	6,790	57.8 U
AS-3025-06-0816	8/4/16	30	25	6	SW	476 U	476 U	476 U	476 U	476 U	476 U	476 U
AS-3025-13-0816	8/4/16	30	25	13	SW	8,850	787	245 U	245 U	245 U	4,670	245 U
AS-3500-11.5-0816	8/1/16	35	0	11.5	NW	44,200	152	116	347	106 U	8,430	106 U
AS-3500-14.5-0816	8/1/16	35	0	14.5	NW	155,000	568	107 U	656	107 U	6,280	107 U
AS-3505-14.5-0816	8/9/16	35	5	14.5	C	50.3 U	50.3 U	50.3 U	581	50.3 U	50.3 U	50.3 U
AS-3520-16-0816	8/9/16	35	20	16	C	2,930	156	55 U	55 U	55 U	165	55 U
AS-4005-06-0816	8/4/16	40	5	6	NW	159	132 U	132 U	132 U	132 U	132 U	132 U
AS-4005-10-0816	8/4/16	40	5	10	NW	3,820	400	128 U	128 U	128 U	1,860	128 U
AS-4015-06-0816	8/4/16	40	15	6	SW	142 U	142 U	142 U	142 U	142 U	142 U	142 U
AS-4015-12-0816	8/4/16	40	15	12	SW	8,490	1,080	482 U	482 U	482 U	5,630	482 U
RBC Excavation Worker⁽³⁾						1,500,000	890,000,000	50,000,000	13,000,000	710,000	370,000,000	950,000

Notes:¹ Distance is keyed to a benchmark located approximately 15 feet east of the excavation² Sample AS-1530-06-0816 is: AS(Acid Sump)-1530(15 feet east of benchmark and 30 feet south of excavation north wall)-06(6 feet deep)-0816(collection date)³ RBC = Risk-Based Concentration. Source: Oregon Department of Environmental Quality table, "Risk-Based Concentrations for Individual Chemicals," revision dated November 1, 2015.
(shown for comparative purposes only)

TCA = 1,1,1-trichloroethane

DCA = 1,1-dichloroethane

PCE = tetrachloroethene

TCE = trichloroethene

cis-DCE = cis-1,2-dichloroethene

DCE = 1,1-dichloroethene

VC= vinyl chloride

U = Compound not detected and reported as less than the reporting limit

Attachment D

Design Investigation and Remedy Selection Report Groundwater Data, Soil Data, and Boring Logs (Geosyntec, 2009)

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TABLE A-1. GROUNDWATER VOC CONCENTRATIONS (TEST AMERICA LABORATORY ANALYSIS)

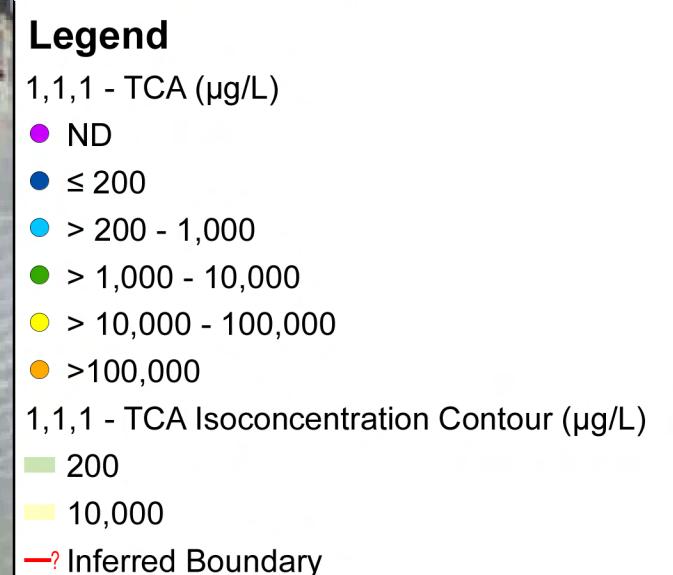
Acid Sump Area, Wah Chang, Albany, OR

Wah Chang - Acid Sump Area	Sample Name ¹ Dilution	GW-01-10-15 11/07/2008 10:30 100	GW-02-8.5-13.5 11/04/2008 16:30 200	GW-03-10-15 11/04/2008 10:05 2000	GW-04-10-15 11/05/2008 10:15 50000	GW-05-8-13 11/06/2008 16:10 2000	GW-06-10-15 11/04/2008 11:40 50000	GW-07-10-15 11/06/2008 17:15 200	GW-08-10-15 11/07/2008 16:00 50	GW-10-10-15 11/07/2008 12:30 200	GW-11-8-13 11/07/2008 11:45 500	GW-12-10-15 11/07/2008 16:30 40	GW-13-10-15 11/07/2008 13:20 1	GW-15-7-12 11/07/2008 17:00 200	Blind Duplicate ² 11/07/2008 10:00 20	Field Blank 11/05/2008 14:00 1	TRIP BLANK 11/04/2008 00:00 1	TRIP BLANK 11/06/2008 00:00 1	TRIP BLANK 11/07/2008 00:00 1
Analyte (µg/L)	CAS Number	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	
Acetone	67-64-1	2500	U	5000	UC	50000	UC	5000	U	12500	U	1000	U	25.0	UC	500	U	500	U
Benzene	71-43-2	100	U	200	U	2000	U	50000	U	200	U	500	U	1.00	U	200	U	1.00	U
Bromobenzene	108-86-1	100	U	200	U	2000	U	50000	U	200	U	500	U	1.00	U	200	U	1.00	U
Bromochloromethane	74-97-5	100	U	200	U	2000	U	50000	U	200	U	200	U	1.00	U	200	U	1.00	U
Bromodichloromethane	75-27-4	100	U	200	U	2000	U	50000	U	200	U	200	U	1.00	U	200	U	1.00	U
Bromoform	75-25-2	100	U	200	U	2000	U	50000	U	200	U	500	U	212	J	1.00	U	200	U
Bromomethane	74-83-9	500	U	1000	U	10000	U	250000	U	1000	U	250	U	1000	U	2500	U	100	U
2-Butanone (MEK)	78-93-3	1000	U	2000	U	50000	U	2000	U	2000	U	500	U	10.0	U	2000	U	10.0	U
n-Butylbenzene	104-51-8	500	U	1000	U	10000	U	250000	U	1000	U	250	U	1000	U	2500	U	100	U
sec-Butylbenzene	135-98-8	100	U	200	U	2000	U	50000	U	200	U	500	U	1.00	U	200	U	20.0	U
tert-Butylbenzene	98-06-6	100	U	200	U	2000	U	50000	U	200	U	500	U	1.00	U	200	U	1.00	U
Carbon disulfide	75-15-0	1000	U	2000	U	20000	U	500000	U	2000	U	500	U	40.0	U	2000	U	10.0	U
Carbon tetrachloride	56-23-5	100	U	200	U	2000	U	50000	U	200	U	500	U	1.00	U	200	U	1.00	U
Chlorobenzene	108-90-7	100	U	200	U	2000	U	50000	U	200	U	500	U	1.00	U	200	U	1.00	U
Chloroethane	75-00-3	100	U	200	U	2000	U	50000	U	876	J	2000	U	50.0	U	445	J	40.0	U
Chloroform	67-66-3	100	U	200	U	2000	U	50000	U	200	U	500	U	1.00	U	200	U	1.00	U
Chloromethane	74-87-3	500	U	1000	U	10000	U	250000	U	1000	U	1000	U	250	U	2500	U	500	U
2-Chlorotoluene	95-49-8	100	U	200	U	2000	U	50000	U	200	U	2000	U	50.0	U	500	U	100	U
4-Chlorotoluene	106-43-4	100	U	200	U	2000	U	50000	U	200	U	2000	U	50.0	U	500	U	100	U
1,2-Dibromo-3-chloropropane	96-12-8	500	U	1000	U	10000	U	250000	U	1000	U	10000	U	250	U	2500	U	500	U
Dibromochloromethane	124-48-1	100	U	200	U	2000	U	50000	U	200	U	2000	U	50.0	U	500	U	100	U
1,2-Dibromoethane	106-93-4	100	U	200	U	2000	U	50000	U	200	U	2000	U	50.0	U	500	U	100	U
Dibromomethane	74-95-3	100	U	200	U	2000	U	50000	U	200	U	2000	U	50.0	U	500	U	100	U
1,2-Dichlorobenzene	95-50-1	100	U	200	U	2000	U	50000	U	200	U	2000	U	50.0	U	500	U	100	U
1,3-Dichlorobenzene	541-73-1	100	U	200	U	2000	U	50000	U	200	U	2000	U	50.0	U	500	U	100	U
1,4-Dichlorobenzene	106-46-7	100	U	200	U	2000	U	50000	U	200	U	2000	U	50.0	U	500	U	100	U
Dichlorodifluoromethane	75-71-8	500	U	1000	U	10000	U	25000	U	1000	U	10000	U	250	U	2500	U	500	U
1,1-Dichloroethane	75-34-3	976	300	8400	J	1820	31900	2910	1870	1370	2420	7.20	J	7.60	400	196	45.8	1330	1.00
1,2-Dichloroethane	107-06-2	100	U	424	2000	U	5000	U	1060	2000	U	50.0	U	1.00	U	200	U	1.00	U
1,1-Dichloroethene	75-35-4	242	5820	61900	63000	11100	35200	7880	11200	11200	22.4	J	3.27	2540	700	132	253	1.00	1.00
cis-1,2-Dichloroethene	156-59-2	100	U	200	U	2000	U	50000	U	200	U	200	U	50.0	J	64.0	J	43.2	20.0
trans-1,2-Dichloroethene	156-60-5	100	U	200	U	2000	U	50000	U	200	U	200	U	50.0	U	200	U	1.00	U
1,2-Dichloropropane	78-87-5	100	U	200	U	2000	U	50000	U	200	U	200	U	50.0	U	200	U	1.00	U
1,3-Dichloropropane	142-28-9	100	U	200	U	2000	U	50000	U	200	U	200	U	50.0	U	200	U	1.00	U
2,2-Dichloropropane	594-20-7	100	U	200	U	2000	U	50000	U	200	U	200</td							

TABLE A-2. GROUNDWATER VOC CONCENTRATIONS (CH2M HILL LABORATORY ANALYSIS)

Acid Sump Area, Wah Chang, Albany, OR

Sample Name ¹	GW-03R-10-15	GW-08R-10-15	GW-09R-9-14	GW-13R-9-14	GW-15R-10-15	GW-17-10-15	GW-19-10-15	GW-20-10-15	GW-21-10-15	GW-22-9-14	Blind Duplicate ²	Field Blank	TRIP BLANK	TRIP BLANK		
Sample Date	12/1/2008 12:05	12/1/2008 12:06	12/2/2008 14:03	12/2/2008 15:30	12/2/2008 12:33	12/2/2008 15:26	12/1/2008 14:10	12/2/2008 11:04	12/2/2008 12:23	12/2/2008 6:00	Result ³ Qual	Result ³ Qual	Result ³ Qual	Result ³ Qual		
Analyte (µg/L)																
Acetone	10.8	J	28.2	J	250	U	25.0	U	1.87	J	5.00	U	250	U	100	U
Benzene	10.0	U	5.00	U	25.0	U	0.96	J	2.50	U	0.12	J	0.50	U	0.90	J
Bromobenzene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	0.50	U	10.0	U
Bromoform	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.14	J	0.50	U	0.50	U
Bromochloromethane	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Bromodichloromethane	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	0.50	U	0.50	U
2-Butanone (MEK)	100	U	50.0	U	250	U	25.0	U	5.00	U	5.00	U	250	U	100	U
n-Butylbenzene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	0.50	U	2.50	U
sec-Butylbenzene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	0.50	U	2.50	U
tert-Butylbenzene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	0.50	U	2.50	U
Carbon disulfide	20.0	U	10.0	U	50.0	U	5.00	U	1.00	U	1.00	U	50.0	U	20.0	U
Carbon tetrachloride	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Chlorobenzene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Chloroethane	9.91	J	15.6		25.0	U	3.35		2.50	U	0.86	J	0.21	J	25.0	U
2-Chloroethylvinyl ether	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Chloroform	5.96	J	2.16	J	11.1	J	2.79		2.50	U	0.61	J	0.17	J	25.0	U
1-Chlorohexane	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	10.0	U
Chloromethane	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	10.0	U
2-Chlorotoluene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	10.0	U
4-Chlorotoluene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	10.0	U
Dibromochloromethane	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.090	J
1,2-Dibromoethane (1,2-EDB)	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
Dibromomethane	10.0	U	5.00	U	25.0	U	2.50	U	4.50		0.50	U	25.0	U	3.81	
1,2-Dichlorobenzene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	10.0	U
1,3-Dichlorobenzene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	10.0	U
1,4-Dichlorobenzene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
Dichlorodifluoromethane	10.0	U	5.00	U	25.0	U	5.16		0.50	U	0.50	U	25.0	U	0.50	U
1,1-Dichloroethane	846		2900	D	1610		225		50.7		14.4		561		71.7	
1,2-Dichloroethane	10.0	U	3.82	J	20.3	J	5.92		6.49	J	0.31	J	0.070	J	25.0	U
1,1-Dichloroethene	2340	D	553		10800	D	1710	D	1210	D	126	D	33.7		2940	
cis-1,2-Dichloroethene	10.0	U	5.00	U	5.77	J	34.4		64.9		0.57		0.20	J	25.0	U
trans-1,2-Dichloroethene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	10.0	U
1,2-Dichloropropane	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
1,3-Dichloropropane	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
2,2-Dichloropropane	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
1,1-Dichloropropene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
trans-1,3-Dichloropropene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
Ethylbenzene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
Hexachlorobutadiene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
2-Hexanone	100	U	5.00	U	250	U	25.0	U	5.00	U	5.00	U	250	U	5.00	U
Isopropylbenzene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
p-Isopropyltoluene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
4-Methyl-2-pentanone	100	U	3.78	J	250	U	25.0	U	0.44	J	0.20	J	0.17	J	100	U
Methyl tert-butyl ether	20.0	U	10.0	U	50.0	U	5.00	U	1.00	U	1.00	U	50.0	U	2.00	U
Methylene chloride	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
Naphthalene	10.0	U	5.00	U	25.0	U	2.50	U	0.47	J	0.090	J	25.0	U	0.50	U
n-Propylbenzene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U	0.50	U
Styrene	10.0	U	5.00	U	25.0	U	2.50	U	0.50	U	0.50	U	25.0	U</		



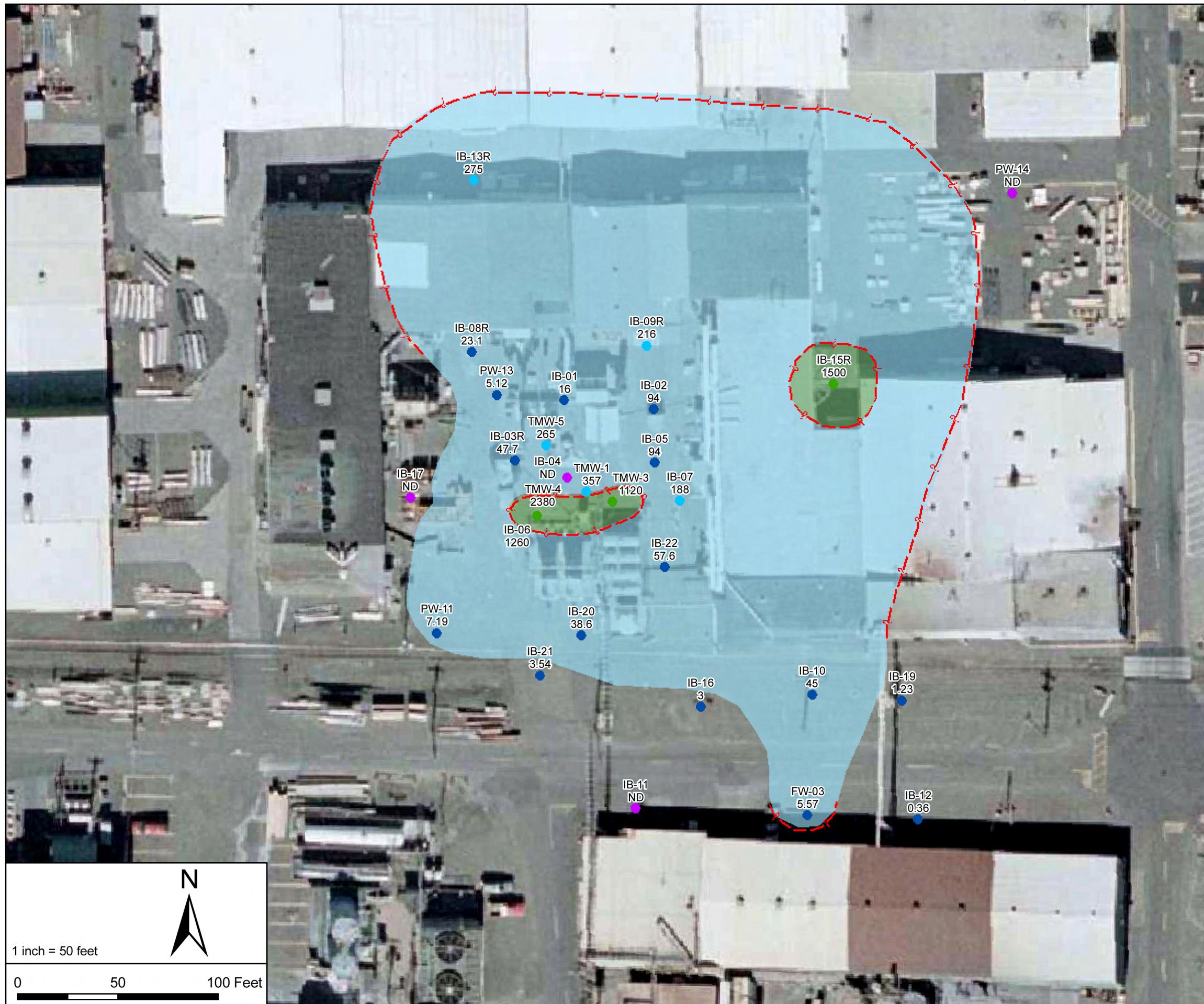
Notes:

1. All contour values are $\mu\text{g}/\text{L}$ (microgram per liter).
2. TCA - Trichloroethane
3. Aerial imagery copyright Microsoft.
4. Data Sources:
PW: October 2008 sampling event (CH2M Hill)
FW: November 2008 sampling event (CH2M Hill)
TMW: October 2008 investigation (CH2M Hill)
IB and IB-R: November and December 2008, Appendix A, this report

Figure 4-4
1,1,1 - TCA Isocontour
Wah Chang Facility

March 2009

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Legend

TCE ($\mu\text{g}/\text{L}$)

- ND
- ≤ 100
- 100 - 1,000
- > 1,000

TCE Isoconcentration Contour ($\mu\text{g}/\text{L}$)

- 5
- 1,000

— Inferred Boundary

Notes:

1. All contour values are $\mu\text{g}/\text{L}$ (microgram per liter).
2. TCE - Trichloroethene
3. IB-15 is highlighted red to indicate the anomalous nature of the data point. Insufficient data available to incorporate in isocontour.
4. Aerial imagery copyright Microsoft.

5. Data Sources:
 - PW-11 and PW-13: October 2008 sampling event (CH2M Hill)
 - PW-14: Spring 2007 sampling event (CH2M Hill)
 - FW: November 2008 sampling event (CH2M Hill)
 - TMW: October 2008 investigation (CH2M Hill)
 - IB and IB-R: November and December 2008, Appendix A, this report

Figure 4-5
TCE Isocontour
Wah Chang Facility

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TABLE A-6. SOIL VOC CONCENTRATIONS (1 of 2)
Acid Sump Area, Wah Chang, Albany, OR

Wah Chang - Acid Sump Area	Sample Name ¹	SB-01-13-13.5 11/06/2008 16:05 % Solids	SB-02-14-14.5 11/04/2008 15:40 74.4	SB-03-9.2-9.6 11/04/2008 09:30 89.8	SB-03-14.5-15.0 11/04/2008 09:10 90.8	SB-04-12.5-13 11/06/2008 14:20 81.6	SB-04-14.5-15 11/06/2008 14:35 86.1	SB-04-15.5-16 11/06/2008 14:35 87.8	SB-05-11.5-12 11/05/2008 09:20 84.6	SB-05-12-12.5 11/05/2008 09:30 82.6	SB-05-15.5-16 11/05/2008 09:40 83.2	SB-06-11.5-12 11/06/2008 15:05 83.7	SB-06-15.5-16 11/06/2008 15:15 80.8	SB-07-9.5-10 11/04/2008 10:50 86.8
Analyte (µg/kg) ²	CAS Number	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³	Result ³
Acetone	67-64-1	3310 U	2780 U	2680 U	2870 U	2770 U	2830 U	2870 U	2900 U	2910 U	2800 U	2900 U	3040 U	2770 U
Benzene	71-43-2	26.5 U	22.2 U	21.4 U	24 U	23 U	22.1 U	22.6 U	23 U	23.3 U	22.4 U	23.3 U	24.3 U	22.2 U
Bromobenzene	108-86-1	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Bromochloromethane	74-97-5	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Bromodichloromethane	75-27-4	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Bromoform	75-25-2	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Bromomethane	74-83-9	662 U	555 U	535 U	600 U	575 U	553 U	566 U	575 U	580 U	582 U	559 U	607 U	554 U
2-Butanone (MEK)	78-93-3	1320 U	1110 U	1070 U	1200 U	1150 U	1110 U	1130 U	1150 U	1160 U	1160 U	1120 U	1210 U	1110 U
n-Butylbenzene	104-51-8	662 U	555 U	535 U	600 U	575 U	37.6 J	566 U	575 U	580 U	173 J	559 U	607 U	554 U
sec-Butylbenzene	135-98-8	132 U	111 U	107 U	120 U	115 U	34.3 J	113 U	115 U	116 U	136	112 U	121 U	111 U
tert-Butylbenzene	98-06-6	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Carbon disulfide	75-15-0	1320 U	1110 U	1070 U	1200 U	1150 U	1110 U	1130 U	1150 U	1160 U	1160 U	1120 U	1210 U	1110 U
Carbon tetrachloride	56-23-5	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Chlorobenzene	108-90-7	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Chloroethane	75-00-3	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Chloroform	67-66-3	132 U	111 U	107 U	120 U	115 U	13.3 J	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Chloromethane	74-87-3	662 U	555 U	535 U	600 U	575 U	553 U	566 U	575 U	580 U	582 U	559 U	607 U	554 U
2-Chlorotoluene	95-49-8	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
4-Chlorotoluene	106-43-4	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
1,2-Dibromo-3-chloropropane	96-12-8	662 U	555 U	535 U	600 U	575 U	553 U	566 U	575 U	580 U	582 U	559 U	607 U	554 U
Dibromochloromethane	124-48-1	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
1,2-Dibromoethane	106-93-4	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Dibromomethane	74-95-3	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
1,2-Dichlorobenzene	95-50-1	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
1,3-Dichlorobenzene	541-73-1	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
1,4-Dichlorobenzene	106-46-7	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Dichlorodifluoromethane	75-71-8	662 U	555 U	535 U	600 U	575 U	553 U	566 U	575 U	580 U	582 U	559 U	607 U	554 U
1,1-Dichloroethane	75-34-3	132 U	111 U	107 U	120 U	115 U	82.8 J	2810	91.7 J	267	116 U	116 U	112 U	1890 J
1,2-Dichloroethane	107-06-2	132 U	111 U	107 U	120 U	115 U	14.9 J	111 U	113 U	115 U	116 U	112 U	121 U	111 U
1,1-Dichloroethene	75-35-4	132 U	111 U	107 U	120 U	285	4560	31.7 J	3690	116 U	116 U	112 U	572	48.8 J
cis-1,2-Dichloroethene	156-59-2	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
trans-1,2-Dichloroethene	156-60-5	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
1,2-Dichloropropane	78-87-5	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
1,3-Dichloropropane	142-28-9	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
2,2-Dichloropropane	594-20-7	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
1,1-Dichloropropene	563-58-6	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
cis-1,3-Dichloropropene	10061-01-5	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
trans-1,3-Dichloropropene	10061-02-6	132 U	111 U	107 U	120 U	115 U	111 U	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Ethylbenzene	100-41-4	132 U	111 U	107 U	120 U	115 U	59.8 J	113 U	115 U	116 U	116 U	112 U	121 U	111 U
Hexachlorobutadiene	87-68-3	530 U	444 U	428 U	480 U	460 U	443 U	453 U	460 U	464 U	465 U	447 U	486 U	444 U
2-Hexanone	591-78-6	1320 U	1110 U	1070 U	1200 U	1150 U	1110 U							

TABLE A-6. SOIL VOC CONCENTRATIONS (2 of 2)
Acid Sump Area, Wah Chang, Albany, OR

Wah Chang - Acid Sump Area	Sample Name ¹	SB-07-15.5-16.0	SB-08-12.5-13	SB-09-9.5-10	SB-09-13.8-14.3	SB-10-14-14.5	SB-11-14.5-15	SB-12-6.5-7	SB-12-13.5-14	SB-13-9.5-10	SB-13-15-15.5	SB-15-13.5-14	SB-16-14.5-15
	Sample Date	11/04/2008 10:30	11/06/2008 15:45	11/07/2008 14:35	11/07/2008 14:40	11/07/2008 11:05	11/07/2008 09:10	11/07/2008 09:50	11/07/2008 09:55	11/07/2008 12:30	11/07/2008 12:35	11/07/2008 11:55	11/07/2008 08:25
	% Solids	88.8	81.1	89.4	78.6	78.6	70.0	79.6	80.8	71.8	84.3	72.7	81.3
Analyte (µg/kg)²	CAS Number	Result³											
Acetone	67-64-1	2780 U	3070 U	400 J	365 J	445 J	469 J	426 J	565 J	410 J	468 J	3030 U	
Benzene	71-43-2	22.2 U	24.6 U	22 U	25.2 U	25.4 U	28.5 U	24.2 U	27.8 U	23.1 U	27.3 U	24.3 U	
Bromobenzene	108-86-1	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Bromochloromethane	74-97-5	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Bromodichloromethane	75-27-4	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Bromoform	75-25-2	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Bromomethane	74-83-9	556 U	615 U	549 U	631 U	634 U	711 U	606 U	605 U	694 U	577 U	684 U	607 U
2-Butanone (MEK)	78-93-3	1110 U	1230 U	1100 U	1260 U	1270 U	1420 U	1210 U	1210 U	1390 U	1150 U	1370 U	1210 U
n-Butylbenzene	104-51-8	556 U	615 U	549 U	631 U	634 U	711 U	606 U	605 U	694 U	577 U	684 U	607 U
sec-Butylbenzene	135-98-8	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
tert-Butylbenzene	98-06-6	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Carbon disulfide	75-15-0	1110 U	1230 U	1100 U	1260 U	1270 U	1420 U	1210 U	1210 U	1390 U	1150 U	1370 U	1210 U
Carbon tetrachloride	56-23-5	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Chlorobenzene	108-90-7	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Chloroethane	75-00-3	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Chloroform	67-66-3	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Chloromethane	74-87-3	556 U	615 U	549 U	631 U	634 U	711 U	606 U	605 U	694 U	577 U	684 U	607 U
2-Chlorotoluene	95-49-8	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
4-Chlorotoluene	106-43-4	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
1,2-Dibromo-3-chloropropane	96-12-8	556 U	615 U	549 U	631 U	634 U	711 U	606 U	605 U	694 U	577 U	684 U	607 U
Dibromochloromethane	124-48-1	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
1,2-Dibromoethane	106-93-4	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Dibromomethane	74-95-3	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
1,2-Dichlorobenzene	95-50-1	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
1,3-Dichlorobenzene	541-73-1	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
1,4-Dichlorobenzene	106-46-7	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Dichlorodifluoromethane	75-71-8	556 U	615 U	549 U	631 U	634 U	711 U	606 U	605 U	694 U	577 U	684 U	607 U
1,1-Dichloroethane	75-34-3	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 J	49.7 J
1,2-Dichloroethane	107-06-2	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
1,1-Dichloroethene	75-35-4	111 U	123 U	110 U	1080	17.8 J	142 U	121 U	121 U	139 U	115 U	219	24.3 J
cis-1,2-Dichloroethene	156-59-2	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	30.1 J	121 U
trans-1,2-Dichloroethene	156-60-5	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	37 U	121 U
1,2-Dichloropropane	78-87-5	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
1,3-Dichloropropane	142-28-9	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
2,2-Dichloropropane	594-20-7	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
1,1-Dichloropropene	563-58-6	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
cis-1,3-Dichloropropene	10061-01-5	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
trans-1,3-Dichloropropene	10061-02-6	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Ethylbenzene	100-41-4	111 U	123 U	110 U	126 U	127 U	142 U	121 U	121 U	139 U	115 U	137 U	121 U
Hexachlorobutadiene	87-68-3	445 U	492 U	439 U	505 U	507 U	569 U	485 U	484 U	555 U	462 U	547 U	485 U
2-Hexanone	591-78-6	1110 U	1230 U	1100 U	1260 U	1270 U	1420 U	1210 U	1210 U	1390 U	1150 U	1370 U	1210 U
Isopropylbenzene	98-82-8	222 U	246 U	220 U	252 U	254 U	285 U	242 U	242 U	278 U	231 U	273 U	243 U
p-Isopropyltoluene	99-87-6	222 U	246 U	220 U	252 U	254 U	285 U	242 U	242 U	278 U	231 U	273 U	243 U
4-Methyl-2-pentanone	108-10-1	556 U	615 U	549 U	631 U	6							

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt.						70		
1	<u>Fill:</u> Sandy gravel (2'-2.5'), brown, dry.								
2									
3	With clay (2.5'-3'), gray, dry.								
3	Clayey silt (3'-5'), gray to brown, moist, firm.								
4									
5	Brick fragment.						50		
6									
7									
8	Clayey silt, gray, wet, soft.								
9	Woody material.			SB-01-9-9.5					
9									
10	Gravel layer, brown-gray, moist, semi-consolidated.			GW-01-10-15			70		
11									
12									
13	With gravel, wet.								
13	Gravel with clay, little sand, brown to reddish-brown.								
13	Silt with sand, brown to reddish-brown, moist.								
14	Concrete aggregate, dry.								
14	<u>Linn Gravel:</u> Sandy gravel, brown, wet, semi-consolidated.								
15	Becomes poorly graded, wet.								
15	<u>Spencer Formation:</u> Siltstone (weathered), green-gray, moist.								
16	Total boring depth = 16' bgs.								

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt. <u>Fill:</u> Sandy gravel, well graded.						100		Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
2							3.9		
3									
4	Wet layer (4").								
5							100	5.5	
6									
7									
8									
9	<u>Linn Gravel:</u> Silty and sandy gravel, brown to reddish-brown, dry, well-graded.								
10				GW-02-10-15			100		
11									
12	Becomes moist.								
13	Becomes wet.								▽
14				SB-02-14-14.5			0	4.3	
15	<u>Spencer Formation:</u> Siltstone (weathered).								
16	Total boring depth = 16' bgs.								

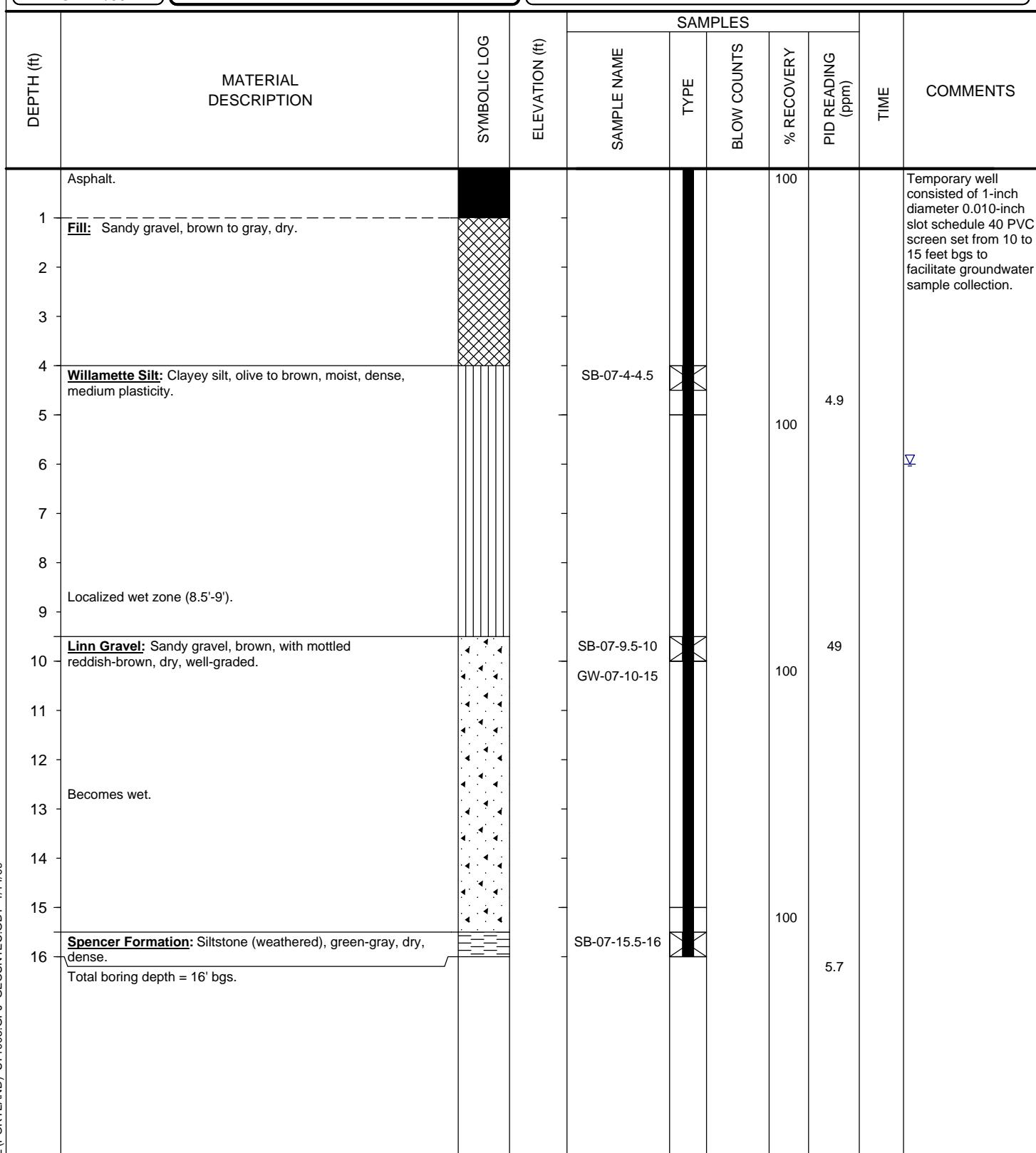
DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt.						100		
1	<u>Fill:</u> Sandy gravel, brown to gray, dry.								
2									
3	<u>Willamette Silt:</u> Clayey silt, olive-gray, moist, firm.								
4	Some black staining (4-5').								
5									
6									
7									
8	<u>Linn Gravel:</u> Sandy gravel, brown to reddish-brown, moist, well-graded.			SB-03-7.5-8					
9				SB-03-9.2-9.6					
10	Becomes wet.			GW-03-10-15			100		
11									
12									
13									
14									
15	Total boring depth = 15' bgs.			SB-03-14.5-15			100	3.1	▽

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt. <u>Fill</u>						40		Temporary well consisted of 1-inch diameter 0.020-inch slot schedule 40 PVC with 10-20 silica sand prepacked screen. Screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
2									
3									
4	<u>Willamette Silt:</u> Clayey silt, with gravel (subangular), dark gray, moist.						100		
5									
6									
7									
8				SB-03R-7.5-8					
9	<u>Linn Gravel:</u> Sandy gravel, brown, moist.			SB-03R-9.2-9.6					
10				GW-03R-10-15			100		
11									
12	Becomes wet.			SB-03R-12.5-13				50	
13				SB-03R-14.5-15				50	
14									
15									
16	<u>Spencer Formation:</u> Siltstone (weathered), medium gray, dry. Total boring depth = 16' bgs.						100		

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt.								
2	<u>Fill:</u> Sandy gravel, brown to gray, dry.								
3	Clayey silt with trace gravel (angular ~4mm), moist, dense, medium to high plasticity.								
4									
5									
6	Gravel (fine), dark gray to brown, moist.								
7	<u>Willamette Silt:</u> Sandy silt, brown with mottled reddish-brown, moist.								
8	Becomes wet.								▽
9	<u>Linn Gravel:</u> Sandy silt with some gravel, brown, dry, well-graded.			SB-04-9.5-10					
10				GW-04-10-15				100	
11									
12									
13				SB-04-12.5-13					
14	Sandy gravel (fine, angular), little silt, green-gray, wet.			SB-04-13-13.5					
15	<u>Spencer Formation:</u> Siltstone (weathered), green-gray, moist.			SB-04-14-14.5					
16	Total boring depth = 16' bgs.			SB-04-14.5-15				100	

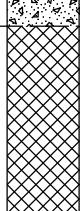
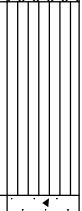
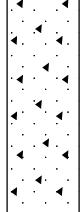
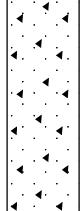
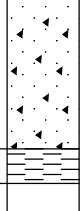
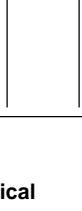
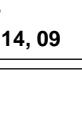
DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt. <u>Fill:</u> Gravel (fine, angular) to sandy gravel, brown to black, dry.						20		Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 8 to 13 feet bgs to facilitate groundwater sample collection.
2									
3									
4									
5									
6									
7									
8	Sandy gravel, top with more sand, gray-brown, moist.			GW-05-8-13					
9									
10									
11	<u>Linn Gravel:</u> Sandy gravel, brown, wet.			SB-05-11.5-12					
12				SB-05-12-12.5					
13	Becomes brown to reddish-brown (13'-15').								
14									
15									
16	<u>Spencer Formation:</u> Siltstone (weathered), green-gray, moist. Total boring depth = 16' bgs.			SB-05-15.5-16					

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt. <u>Fill:</u> Sandy gravel, brown.						80		Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
2									
3									
4	<u>Willamette Silt:</u> Clayey silt, brown (top 6") to gray (3"); gravel at 5'.								
5	Clayey silt, brown-gray with mottled reddish-brown (5'-6.5'), moist, medium dense.						100		
6									
7	Becomes brown, dry, firm.								
8									
9	Sandy silt, brown with mottled reddish-brown, moist.								
10	<u>Linn Gravel:</u> Sandy gravel, brown-gray to reddish-brown, well graded.			GW-06-10-15			60		
11									
12				SB-06-11.5-12					
13									
14									
15	Becomes wet.								
16	<u>Spencer Formation:</u> Siltstone (weathered), green-gray, dry, dense. Total boring depth = 16' bgs.			SB-06-15.5-16			100		



DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt. <u>Fill:</u> Sand, gray, moist.						40		Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
2							50		
3									
4									
5	Gravel with silt, brown.								
6									
7									
8	<u>Willamette Silt:</u> Clayey silt, trace gravel (fine, angular), gray, moist, high plasticity.		SB-08-8-8.5	□	□				
9									
10	<u>Linn Gravel:</u> Silty gravel, stratified.		GW-08-10-15	□	□		60		
11									
12									
13	With concrete aggregate.		SB-08-12.5-13	□	□				
14	Sandy gravel (13.75'-20'), brown, moist.								
15	Becomes wet, poorly-graded.								
16	<u>Spencer Formation:</u> Siltstone (weathered), gray-green, moist. Total boring depth = 16' bgs.						100		

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt. <u>Fill:</u> Gravel with silt subgrade (6"), dark gray.						40		Temporary well consisted of 1-inch diameter 0.020-inch slot schedule 40 PVC with 10-20 silica sand prepacked screen. Screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
2	Sand, gray brown.								
3									
4	Poorly graded (4-5').								
5									
6									
7									
8	<u>Willamette Silt:</u> Clayey silt with gravel, dark gray, moist.		SB-08R-8-8.5	□	□			<1	
9			GW-08R-10-15	□	□		80		
10									
11	<u>Linn Gravel:</u> Gravel with sand and silt, green-red-brown clasts.								
12									
13	Sandy gravel, medium brown, wet.							1.4	▽
14			SB-08R-14-14.5	□	□			1.2	
15			SB-08R-15.5-16	□	□			14.6	
16	<u>Spencer Formation:</u> Siltstone (weathered), medium gray, dry.								
17	Total boring depth = 17' bgs.								

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Concrete. <u>Fill:</u> Gravel with concrete, layer (3") gravel (angular, ~20mm), dry.						56		Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
2									
3	<u>Willamette Silt:</u> Clayey silt, brown-gray, moist.						80		
4									
5									
6	<u>Linn Gravel:</u> Sandy gravel, brown with mottled reddish-brown, dry, semi-consolidated.								
7	Lense of clayey, silty sand with gravel, becomes moist								
8									
9				SB-09-9-9.5					
10				SB-09-9.5-10					
11	Sandy gravel (coarse to fine) layer silty sand, brown with increasing mottled reddish-brown, moist to wet.			GW-09-10-15			80		
12									
13	Gravel becomes coarse, wet.								
14	Gravel (fine, rounded to subrounded), trace silt, very colored, wet.			SB-13.8-14.3					
15	<u>Spencer Formation:</u> Siltstone (weathered), green-gray, moist. Total boring depth = 15' bgs.								

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Concrete. <u>Fill:</u> Gravel, few sand, few clay.						60		Temporary well consisted of 1-inch diameter 0.020-inch slot schedule 40 PVC with 10-20 silica sand prepacked screen. Screen set from 9 to 14 feet bgs to facilitate groundwater sample collection.
2									
3	Layer (2") coarse grained material, black, crystalized, dry.								
4	<u>Willamette Silt:</u> Clayey silt, gray transitioning to gray with brown, moist, high plasticity, firm.								
5	<u>Linn Gravel:</u> Sandy gravel with clayey silt, dry to moist.						100		
6	Becomes gray and brown with mottled reddish-brown, unconsolidated intervals.								
7									
8									
9									
10									
11	Increasing amounts of clay.			GW-09R-9-14				4.5	
12									
13	Less gravel (fine, rounded to subrounded), increasing amounts of silt, increased reddish-brown, wet, very soft.			SB-09R-12.5-13					
14	gravel (coarse) with silt, less reddish-brown, wet.			SB-09R-14.5-15				20	
15	<u>Spencer Formation:</u> Siltstone (weathered), greenish with mottled reddish-green to green-gray, moist to dry at bottom. Total boring depth = 15' bgs.								

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Fill: Gravel (coarse, subangular) to sandy gravel, gray to brown.						40		Within vicinity of railroad track.
2									
3									
4	Becomes wet.								
5	Willamette Silt: Clayey silt, gray to brown, dry to moist, dense, medium plasticity.						70		Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
6									
7									
8				SB-10-8-8.5				<1	
9	Linn Gravel: Sandy gravel, brown, moist.			SB-10-8-9					
10									
11				GW-10-10-15			60		
12	Clayey silt with sand intermixed with clayey silt, gray to gray-brown.								
13	Sandy gravel (13'-15'), brown to reddish-brown, moist to wet, consolidated to unconsolidated.			SB-10-13-13.5					
14				SB-10-14-14.5				7	
15									
16	Spencer Formation: Siltstone (weathered), green-gray, moist.			SB-10-16-16.5			40		
17	Total boring depth = 17' bgs.								

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt. <u>Fill:</u> gravel with sand, gray, dry.						80		Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
2									
3	Crystallized material (3-3.4'), purplish-gray, dry.								
4	<u>Willamette Silt:</u> Clayey silt, gray, moist, dense, high plasticity.		SB-11-3.5-4	X			<1		
5									
6	<u>Linn Gravel:</u> Sandy gravel with clayey silt intermixed (8") with gravel, brown with mottled reddish-brown.								
7									
8	Silty sand (8'-10') with gravel, brown, moist.		GW-11-8-13						
9									
10									
11	Sandy gravel, brown to reddish-brown, wet.								
12									
13									
14									
15			SB-11-14.5-15	X			<1		
16	<u>Spencer Formation:</u> Siltstone (weathered), green-gray, moist, firm.								
17	Total boring depth = 17' bgs.								

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	<u>Fill:</u> 4" gravel, 8" sand, wet.						40		
2									
3									
4	Clayey silt, brown with mottled reddish-brown, moist, firm.								
5	Stratified, gravel, sands intermixed with clayey silt, moist, with wet lens.						100		
6									
7	<u>Willamette Silt:</u> Stratified sandy silt with sandy gravel, brown with mottled reddish-brown, wet.		SB-12-6.5-7	□	□			<1	
8	Clayey silt, brown with trace mottled reddish-brown, wet.								
9	Sandy gravel with silt, increasing reddish-brown (8.5'-10').								
10									
11									
12	Becomes gray-brown.								
13	<u>Linn Gravel:</u> Sandy gravel (fine), brown to reddish-brown, wet.								
14	Becomes gray, wet, unconsolidated.		SB-12-13.5-14	□	□			<1	
15	Gravel, fine, rounded to subrounded, very colored, wet, unconsolidated.								
16	Sandy gravel, brown, wet, unconsolidated.		SB-12-15.5-16	□	□		100	<1	
17	<u>Spencer Formation:</u> Siltstone (weathered), green-gray, moist. Total boring depth = 17' bgs.								

CONTRACTOR Boart Longyear
EQUIPMENT Geoprobe 6620
DRILL MTHD Direct Push
DIAMETER 2.25"
LOGGER EKM

REVIEWER JW

NORTHING
EASTING
ANGLE Vertical
BEARING -----
PRINTED Jan 14, 09

REMARKS: Borehole backfilled with bentonite granules. Soil sample interval indicated in sample name by last two values. Temporary well screened interval indicated in groundwater sample by last two values.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	\Concrete. Fill: Sandy gravel intermixed with sandy silt and clay, gray to brown.						60		Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
2									
3									
4	Willamette Silt: Clayey silt, gray, moist, firm, high plasticity.		SB-13-4-4.5				100	<1	
5	Becomes brown with mottled reddish-brown, less plasticity.								
6									
7									
8	With sandy silt (7'8"-9'6"), firm to soft.								
9			SB-13-9-9.5						
10	With silty sand, increased reddish-brown, firm.		GW-13-10-15				70	<1	
11									
12	Silty sand to silty gravel (fine), gray-brown, saturated.								
13	Becomes wet, soft.								
14	Linn Gravel: Sandy gravel, brown with reddish-brown intervals, wet, semi-consolidated.								
15			SB-13-15-15.5				100		
16	Spencer Formation: Siltstone (weathered), green-gray, dry.								
	Total boring depth = 16' bgs.								

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	\Concrete. Fill: Gravel, brown to gray, moist.						50		
2									
3	Willamette Silt: Clayey silt, gray, dense, firm, high plasticity.								Temporary well consisted of 1-inch diameter 0.020-inch slot schedule 40 PVC with 10-20 silica sand prepacked screen. Screen set from 9 to 14 feet bgs to facilitate groundwater sample collection.
4									
5	Some brown, less plasticity.								
6	Clayey silt, trace sand, brown with mottled reddish-brown, firm, dense, less plasticity.								
7	Increased reddish-brown mottled with black.								
8									
9									
10	With trace sand, brown with less mottled reddish-brown, moist, soft, some plasticity.			GW-13R-9-14					
11									
12	Increased reddish-brown, firm.								
13	Clayey silt, brown to gray, very soft to soft.								
14									
15	With intervals gravel (fine) with silt, wet.								
	Linn Gravel: Gravel (coarse, subangular) with silt, intervals sandy gravel intermixed, brown to reddish-brown, wet.								
	Spencer Formation: Siltstone (weathered), green-gray, moist to dry at bottom.								
	Total boring depth = 15.5' bgs.								

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt. Fill: Sandy gravel, wet.						80		Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
2									
3	Layer of fill sand, brown to gray.								
4	Willamette Silt: Clayey silt, brown, moist, medium dense, firm, low plasticity.								
5	With mottled reddish-brown, increase in plasticity.								
6									
7				SB-15-7-7.5					
8	Silty sand, brown, medium dense, soft to firm.								
9									
10				GW-15-10-15			70		
11									
12	Linn Gravel: Sandy gravel, brown to reddish-brown, moist to wet.								
13	Silty, gravel (angular to subangular), brown-gray, wet.								
14	Sandy gravel (fine), gray.			SB-15-13.5-14			50		
15									
16	Spencer Formation: Siltstone (weathered), green-gray, wet to moist, soft to firm.			SB-15-16-16.5					
17	Total boring depth = 17' bgs.								

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt. <u>Fill:</u> Sandy gravel, with intervals of dry gravel, brown and gray, moist.						60		Temporary well consisted of 1-inch diameter 0.020-inch slot schedule 40 PVC with 10-20 silica sand prepacked screen. Screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
2									
3									
4	Layer of fill sand, moist.								
5	<u>Willamette Silt:</u> Clayey silt, brown, moist, firm, dense, high plasticity. With mottled reddish-brown.						100		
6									
7									▽
8	Becomes wet, soft.								
9									
10				GW-15R-10-15			100		
11	<u>Linn Gravel:</u> Sandy gravel, brown, wet.								
12	With clayey silt.								
13	Sandy gravel, brown with reddish-brown, wet.								
14	Silt with little sand and gravel intervals, wet.			SB-15R-13.5-14				3	
15									
16	Sandy gravel with silt with little to few sand, gray, wet.			SB-15R-15.5-16			100		
17	<u>Spencer Formation:</u> Siltstone, (weathered), dark gray green, moist. Total boring depth = 17' bgs.							6	

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	<u>Fill:</u> Gravel (coarse, angular to subangular), gray to brown.						80		
2									
3	<u>Willamette Silt:</u> Clayey silt, dark brown, moist, medium dense, high plasticity.								
4									
5									
6	Gravel (angular).								
7									
8	Clayey silt with , brown, moist.			GW-16-7-12				<1	
9				SB-16-7.5-8					
10	<u>Linn Gravel:</u> Sandy silt with gravel, brown with mottled reddish-brown, moist.								
11									
12	Sandy gravel, brown to reddish-brown, wet, unconsolidated, poorly-graded.								▽
13									
14									
15				SB-16-14.5-15				2	
16	<u>Spencer Formation:</u> Siltstone (weathered), green-gray, dry, firm.			SB-16-16-16.5			50		
17	Total boring depth = 17.5' bgs.								

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt. Fill: Sand, gravel, medium brown grades to greenish tan.						-		Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
2	Layer of sand, black, moist.								
3	Clayey silt, moist.								
4	Sandy gravel, light gray.								
5	Willamette Silt: Clayey silt, gray, moist.								
6	Linn Gravel: Sandy gravel, brown and gray, moist.								
7									
8	Becomes medium brown.								
9									
10				GW-17-10-15			100	1.4	
11									
12	Becomes wet.								▽
13				SB-17-13-13.5			100		
14									
15									
16	Spencer Formation: Siltstone (weathered), green-gray, moist.			SB-17-16-16.2			100		
	Total boring depth = 16.5' bgs.								

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	<u>Fill:</u> Gravel with sand, trace silt, dry to moist, well graded.						40		
2									
3									
4	Sandy gravel, well graded.								
5	gravel, wet, possible sheen.								
5	<u>Willamette Silt:</u> Clayey silt, gray, moist, firm.						70	1.8	
6									
7	Layer gravel (6"), greenish-red clasts, moist, consolidated.			SB-19-6.5-6.6					
8									
9	Becomes brown with mottled reddish-brown, moist, firm.								
9	Sandy silt with some clay, brown, moist, firm.								
10	<u>Linn Gravel:</u> Sandy gravel, gray, semi-consolidated.			GW-19-10-15			50		
11									
12									
13	With mottled reddish-brown, semi-consolidated.			SB-19-13-13.5					
14									
15	Slight sheen observed, possibly from above.								
15	Sandy gravel, brown, wet, slight sheen top 6".			SB-19-15.5-16			100	1.5	
16				SB-19-16-16.5					
	<u>Spencer Formation:</u> Siltstone (weathered), green-gray, dry, hard.								
	Total boring depth = 16.5' bgs.								

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt. Fill: Sandy gravel, brown, moist, with dark gray gravel intervals.						56		Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 10 to 15 feet bgs to facilitate groundwater sample collection.
2									
3	Willamette Silt: Clayey silt with trace gravel, brown, moist, firm to soft.								
4	Interval (3") dark gray.								
5	Becomes saturated. No gravel, high plasticity.								
6									
7	Linn Gravel: Sandy gravel, medium brown, moist.								
8									
9									
10				GW-20-10-15					
11	Layer of clayey silt, dark gray, moist.								
12	Sandy gravel, brown, wet.			SB-20-12.5-13					
13									
14									
15									
16									
17	Spencer Formation: Siltstone (weathered), green-gray, dry. Total boring depth = 17.3' bgs.			SB-20-16-16.5					

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt.						60		
2	Fill: Gravel, intervals (5") gravel and sand, dry.								
3									
4	Fill sand, brown, moist, clayey silt, gray, moist, high plasticity, dense, firm.								
5	Becomes brown with mottled reddish-brown, low plasticity, firm to soft.						80		
6								<1	
7									
8									
9									
10	With gravel, moist, hard, dense.								
11	Becomes wet.								
12	With gravel (fine).								
13	Fill sand (3").								
14	Gravel (fine, subangular), poorly-graded.								
15	Gravel (coarse, angular), with silt and sand, poorly-graded.								
16	With reddish-brown.								
	<u>Linn Gravel:</u> Gravel with silt, brown to reddish-brown, wet.								
	Gravel (fine, rounded to subrounded), very colored.								
	(Sandy gravel, wet.								
	<u>Spencer Formation:</u> Siltstone (weathered), green-gray, wet to dry at bottom.								
	Total boring depth = 16.5' bgs.								

GS FORM:
BORE 1/99

BOREHOLE RECORD

BORING IB-22

SHEET 1 OF 1

START DATE Dec 2, 08

ELEVATION FT. MSL

FINISH DATE Dec 2, 08

PROJECT Acid Sump Area

LOCATION Wah Chang, Albany, OR

PROJECT NUMBER ST1003

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	ELEVATION (ft)	SAMPLES				TIME	COMMENTS
				SAMPLE NAME	TYPE	BLOW COUNTS	% RECOVERY		
1	Asphalt. Fill: Gravel, intermixed with clay and sands, with concrete fragment.						70		Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 9 to 14 feet bgs to facilitate groundwater sample collection.
2									
3									
4	Fill sand, moist.								
5	Willamette Silt: Clayey silt, gray, moist, soft, high plasticity.						80		
6									
7	Becomes gray and brown, wet.								
8									
9	Becomes moist, firm.			GW-22-9-14				2.7	
10							80	2.2	
11	With trace gravel.								
12	Linn Gravel: Gravel with clay and silt, gray to brown with mottled reddish-brown, semi-consolidated.								
13	Sandy gravel, brown to reddish-brown, wet.								
14	Increased reddish-brown.			SB-22-14.4-14.6					
15	Gravel (fine, rounded to subrounded), very colored, wet.								
16	Sandy gravel with silt, brown, wet. Spencer Formation: Siltstone (weathered), dark green-gray, moist.			SB-22-15.8-16.2			100	3	
	Total boring depth = 16.7' bgs.								

CONTRACTOR Boart Longyear
EQUIPMENT Geoprobe 6600
DRILL MTHD Direct Push
DIAMETER 2.25"
LOGGER EKM

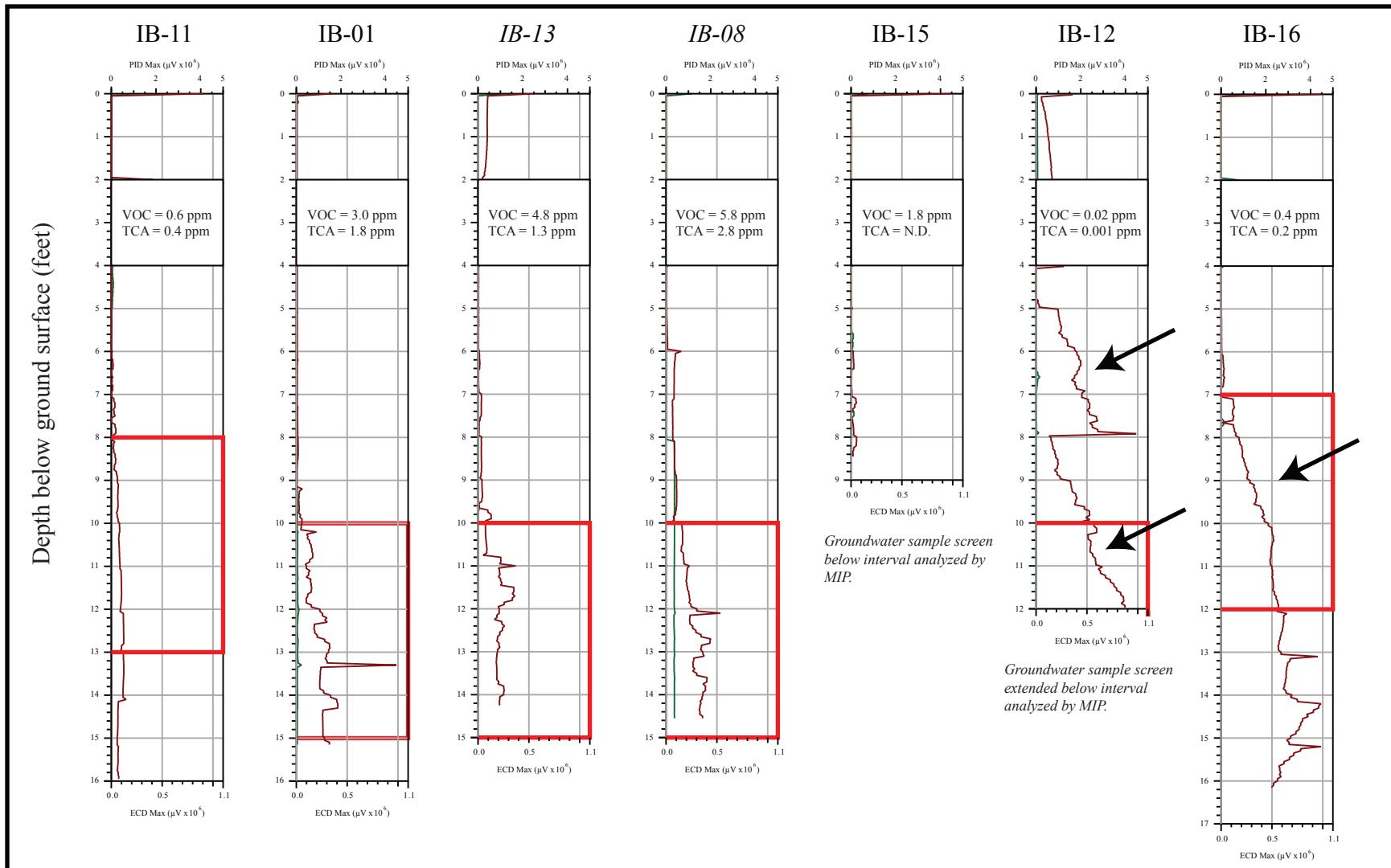
REVIEWER JW

NORTHING
EASTING
ANGLE Vertical
BEARING -----
PRINTED Jan 14, 09

REMARKS: Borehole backfilled with bentonite granules. Soil sample interval indicated in sample name by last two values. Temporary well screened interval indicated in groundwater sample by last two values.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS



Red box indicates groundwater sample screen interval.
Arrows highlight detector drift.
Black boxes contain groundwater concentrations.

LEGEND

PID	
ECD	

Abbreviations

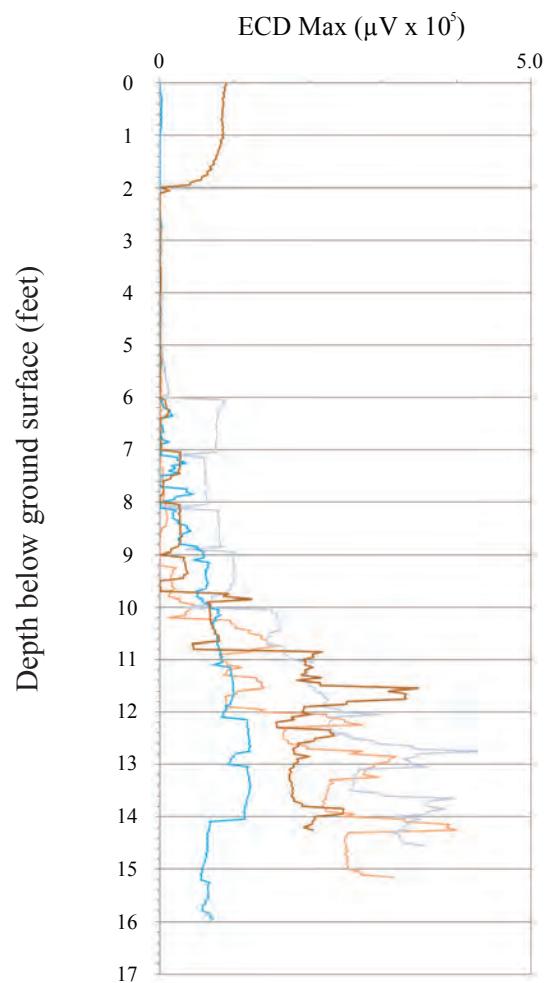
PID - photoionization detector
ECD - electron capture detector
N.D. - not detected
VOC - volatile organic compound
TCA - 1,1,1-trichloroethane

Figure A-1
Low-Range Membrane Interface Probe (MIP) Readings

Project ST1003

March 2009

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consultants

**LEGEND**

IB-01		IB-11	
IB-08		IB-13	

Abbreviations

ECD - electron capture detector

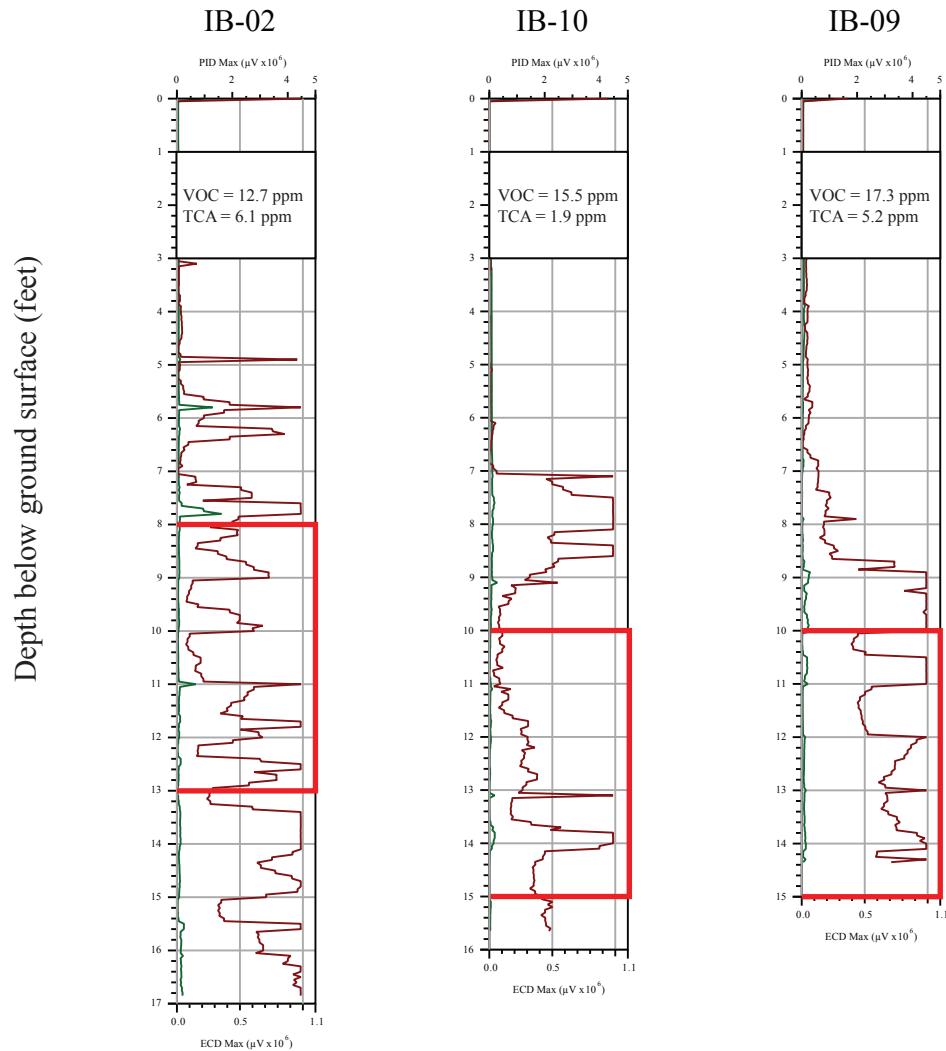
Figure A-2

Low-Range ECD Measurements

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Red box indicates groundwater sample screen interval.
 Black boxes contain groundwater concentrations.

LEGEND

PID	
ECD	

Abbreviations

PID - photoionization detector
 ECD - electron capture detector
 VOC - volatile organic compound
 TCA - 1,1,1-trichloroethane

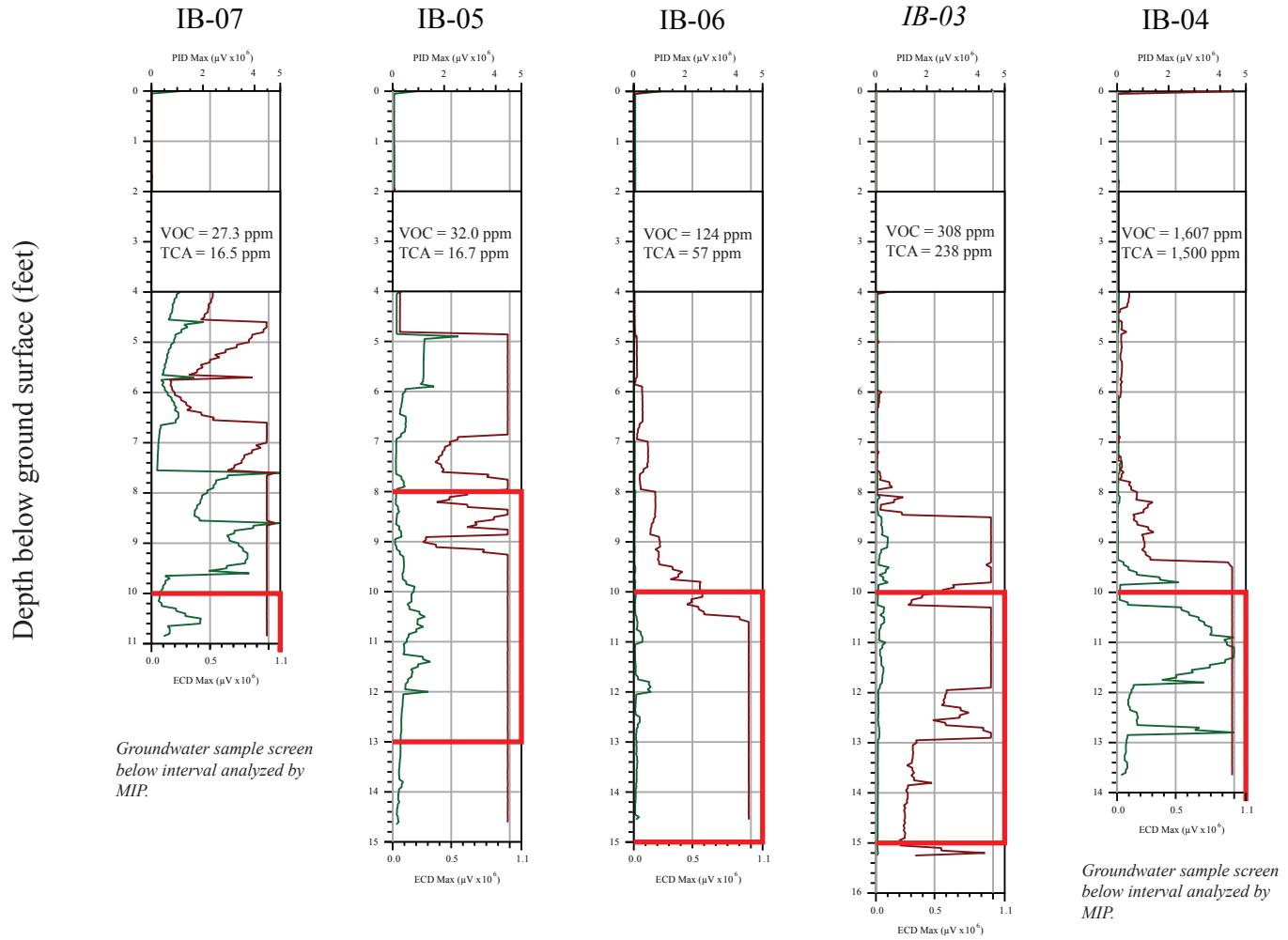
Figure A-3

Mid-Range Membrane Interface Probe (MIP) Readings

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Red box indicates groundwater sample screen interval.
Black boxes contain groundwater concentrations.

LEGEND

PID	
ECD	

Abbreviations

PID - photoionization detector
ECD - electron capture detector
VOC - volatile organic compound
TCA - 1,1,1-trichloroethane

Figure A-4
High-Range Membrane Interface Probe (MIP) Readings

Project ST1003

March 2009

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